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ABSTRACT

This document is the fourth of seven accompanying volumes included in the Rachel Carson Project. The project attempts to introduce environmental education lessons and units into existing courses of study within a high school curriculum rather than to implement environmental education through the introduction of new courses. This volume reports the environmental education activities implemented in the following four special science courses: human ecology, science and society, marine biology, and natural history of Oregon. Course descriptions and objectives, possible topics for research, suggested lecture topics, field trips, annotated film lists, examples of student projects, tests, examples of student handouts, and bibliographies are among the instructional materials included in the report. (MLB)

School District 509J
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# ENVIRONMENTAL STUDIES IN SEVERAL SCIENCE COURSES

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Project Reports, Volume IV
The Rachel Carson Project
USOE Project No. 1-0839
Grant No. OEG-0-71-4623

R. Thomas Tanner, Director

September, 1972

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The research reported herein was performed pursuant to a grant with the U.S. Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

This volume is one of seven which constitute appendices to the "Operating Manual for Rachel Carson High," final report to the U.S. Office of Education, U.S.O.E. grant number OEG-0-71-4623. That report describes the Rachel Carson Project, which was supported by a grant from the Office of Environmental Education of the U.S.O.E. The Project was an attempt to pervade the existing curriculum of a high school with environmental education, with participation by faculty members representing many (ideally all) disciplines.

The project was based upon the philosophy that a positive environmental ethic should pervade our culture subtly but powerfully, just as - some people would say - materialism or pragmatism now do. Perhaps the best way to encourage the new ethic through formal education is to pervade the culture of the school, subtly but powerfully, rather than to establish a single new course such as "Man and Environment" or "The Environmental Ethic." (Note that the American public school does not offer courses in "Materialism" or "Pragmatism" - enculturation to these values, if indeed it occurs, is via more subtle means.)

This philosophy at work was exemplified by the present writer in an article extitled "A Day At Rachel Carson High," which appeared in the Phi Delta Kappan in March, 1970 (vol. 52, no. 7, pp. 399-401). The article follows a boy through one day at the fictitious Carson High. On this day: his chemistry class is dealing with the chemistry of the internal combustion engine and its emissions as they interact with biota; his English class is discussing the novel The Roots of Heaven, about one man's war against ivory hunters; his physical education class is examining various outdoor recreational activities and the degree to which they do or do not interfere with the activities of others; his American problems class is reviewing old American values such as freedom and equality before the law, and discussing the kind of physical environment in which they can best be popularly achieved.

On this particular day, classes are shortened so that teachers may have one of their regular planning meetings, the object of which is to facilitate the planning of their courses around such themes as:

Tomorrow's Technology and Today's License. (Rapaciousness toward natural resources is frequently excused with the rationale that tomorrow's as-yet-undeveloped technology can restore or offer satisfactory substitutes for those resources. This is a dangerous and irresponsible fallacy.)

Man in Nature, Man over Nature. (The belief that we can conquer nature has traditionally pervaded our culture - another dangerous fallacy.)*

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*The reader may wish to refer to other themes and concepts underlying the project. Various of these have been elucidated by the present writer in articles in: The Science Teacher (April 1969, pp. 32-34; April 1972, pp. 12-14; Phi Delta Kappan (March 1970, pp. 353-356); Environmental Education (Summer 1971, pp. 34-37); AIBS Education Division News (August 1972). See also Hawkins, Mary E. (editor), Vital Views of the Environment, National Science Teachers Association, 1971, for an excellent selection of important concepts explained in brief articles by highly qualified authors. We have found this volume useful.

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At the fictional Carson High, more or less standard course titles are retained, but each course includes lessons or units reflecting themes such as those above. During the 1971-72 school year, we attempted to implement this model at the new Crescent Valley High School in Corvallis, although some of our work was also done in Corvallis High School, for reasons discussed in the body of our final report.

Participation was sufficiently wide and diverse as to include classes in typing, modern foreign languages, home economics, industrial arts, drivers' training, English, the natural and social sciences, and mathematics, as well as so-called extra-curricular activities. As noted earlier, this volume is one of seven, largely teacher-written, which describe the lessons and units developed during our brief experiment in curriculum innovation.

We hope that the Rachel Carson idea and at least some of these materials will be found worthy of emulation elsewhere.

We wish to thank all of those who participated in the project, and we especially wish to thank Dr. Clarence D. Kron, now Chairman of the Department of Education at the new University of Texas of the Permian Basin in Odessa. As Superintendent of Corvallis Schools, he offered the unfailing support which made the project possible. We are confident that vision and dedication will continue to characterize his performance at his new position, as was true here. We wish to thank also our new Superintendent, Dr. Thomas D. Wogaman, for continuing to provide an atmosphere congenial to our work during its final stages.

The titles of the report and the seven accompanying volumes are as follows:

Main Report: OPERATING MANUAL FOR RACHEL CARSON HIGH

Accompanying Volumes:

I. MAN AND NATURE - A LITERATURE COURSE
II. THE AMERICAN AND HIS ENVIRONMENT - A SOCIAL SCIENCES COURSE
III. ENVIRONMENTAL STUDIES IN THE PHYSICAL SCIENCES
IV. ENVIRONMENTAL STUDIES IN SEVERAL SCIENCE COURSES
V. CASE STUDIES OF CONSERVATION "BATTLES"
VI. ENVIRONMENTAL STUDIES IN NINE COURSES AT CRESCENT VALLEY HIGH
VII. ENVIRONMENTAL STUDIES: FIVE MISCELLANEOUS REPORTS

R. Thomas Tanner, Director, The Rachel Carson Project

Cispus Environmental Learning Center
Randle, Washington 98377
September 23, 1972

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Human Ecology, Science and Society, and Marine Biology
by Jack Whitney and Randy E. Wilkinson

Natural History of Oregon, by Jerry Colonna, Helena
Zimmerman, and Judith Koerner

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# Several Special Courses

by

Jack Whitney

and

Randy E. Wilkinson

Editor's Note: Mr. Whitney, a C.V.H.S. teacher, introduced three one-semester courses during second semester: human ecology, science and society, and marine biology. Included here are his outlines and handouts referring to these courses, in addition to his brief descriptions of two first-semester courses.

Mr. Wilkinson, a student at Oregon State University, assisted in Mr. Whitney's science and society class during winter term, working as a preprofessional aide. His paper provides insights into the conduct of the classes and the way in which an aide was utilized.

We have also included two samples of student papers, exactly as they were submitted; no guarantee of accuracy or completeness in these papers, nor agreement with any position they take, should be inferred from our inclusion of them here.

Mr. Whitney conducts very informal, student-center, discussion-based classes, using the following vehicles of instruction: research papers (two per semester), guest speakers, films, field trips, assigned readings and discussions.

The contents of this section are:


I. Descriptions of Three Second-Semester Courses, by Jack Whitney

A. Human Ecology
- Course Summary *
- Objectives *
- Some Possible Topics for Research *
- Speakers
- Field Trips
- Films
- Sample Student Paper (by Barbara McKitrick)

B. Science and Society
- Summary *
- Objectives *
- A Few Possible Research Topics *
- Speakers
- Field Trips
- Films
- Sample Student Paper (by Bill Rickham)

C. Marine Biology
- Summary *
- Objectives *
- Speakers
- Field Trips
- Films

II. Materials Prepared by Randy E. Wilkinson
- Narrative
- Knowledge Inventory *
- Answers to the Knowledge Inventory *

III. Brief Descriptions of Two First-Semester Courses, by Jack Whitney


* Handouts distributed to students in the classes.

HUMAN ECOLOGY

Spring, 1972
Jack Whitney

Consideration of the impact of man upon his total environment; and the effects of a changing environment upon man. Extensive reading will be required, mostly in areas of special interest to the individual student. Seminar type discussions will be a major part of the course. Average or better skill in reading is required.

JW:jf

HUMAN ECOLOGY

Spring, 1972
Mr. Jack Whitney

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Objectives
Each student should:

I. Demonstrate a truly broad and deep awareness of two or more changes man has made in his environment. His understanding should include:

   a) The history and causes of the changes.
   b) Social values which encouraged or permitted the changes.
   c) The impact of these changes upon the total environment, and men in particular.
   d) Any special aspects of the changes studies; such as:

      1. Religious significance
      2. Political importance
      3. Economic implications
      4. Effects upon physical and mental health.

II. Show equally thorough knowledge, in his two areas of special concentration, of:

   a) How man is (or is not) acting to correct undesirable changes in his environment - or,
   b) How man is (or is not) profiting from desirable changes he has effected in his environment - or,
   c) Both of the above.

III. These stated objectives will be evaluated in terms of the student's success in:

   a) Producing two major research papers covering the questions he has chosen. (Approximately nine weeks will be allowed per paper.)
   b) Presenting orally the results of his research to the others in the course, and leading the group in discussing the topic.
   c) Arranging for a guest speaker in one or both of his areas of study. An alternative may be the planning of a field trip.
   d) Actively participating in all whole - class activities; e.g. speakers, films, field trips, assigned readings, and group discussions.

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HUMAN ECOLOGY
Spring, 1972

Whitney

## Some Possible Topics for Research

Problems in Cities
Land Use - And Abuse
Use of Insecticides
Biological Pest Control
Population Growth
Urban Sprawl
The Frontier Ethic
Noise Pollution
Wilderness
Environmental Quality & Capitalism
Extinction of Wildlife
Waste Disposal
Resource Distribution & Depletion
Effects of Crowding
Smog
Water Pollution
Air Pollution
Automobiles As An Ecological Force
Packaging Materials
Sewage Treatment & Disposal
Heat As A Pollutant
Radiation Hazards
Recycling
Human Needs - Real & Artificial
Esthetic Improvements Planned & Possible
Herbicides (Defoliation In Peace & War)
War As An Ecological Determinant
Man In - Or Above - Nature
Agricultural Practices
Food & Famine
Disease - Existing & Potential
Advertising & Ecological Responsibility
Public Attitudes
Environmental Quality & Capitalism
Man or Insect
Whose Responsibility

These are a few of many possible topics one might investigate; and many of the listings above are much too general as they are written. For example, "Waste Disposal" could be broken down into many smaller sub-topics; e.g., Management of Solid Wastes, Radioactive Wastes, etc.

Speakers, Human Ecology

2/14/72: 2 officers in local ZPG chapter, Steve Rosenkoetter and Alan Anderson spoke re. population explosion; what is means re. all aspects of life; need for, and methods of, control.

2/24/72: Sharon Mayes, school nurse, explained family planning, free help available locally re. contraception, abortion, etc.

2/28/72: Dr. Kreiger, a state forestry researcher, spoke re. logging practices; the good and the bad in clear-cutting, particularly.

3/15/72: Dr. Poppleton, U. S. Bureau of Mines, Albany, spoke re. utilization of mine wastes; of compressing processed sewage solids into fine building bricks; of increased efforts to "police" mining operations to prevent pollution of local waters, etc.

4/28/72: Prof. John Mingle, O. S. U. Engineering Dept. spoke re. nature of emissions from internal combustion engines and means of reducing them; re. costs and power requirements, etc. for electric and steam-powered cars.

5/11/72: Social worker from Benton County Juvenile Authority spoke re. "The Battered Child" and his usual home environment. Discussed possible effects of crowded conditions in cities upon parent and child.

5/12/72: Dr. Karl Hornyik, O.S.U. Radiation Center, spoke re. ecological effects of nuclear power plants. Gave a "reasonably" balanced view.

5/25/72: Dr. Charles Miller, Oceanography, O.S.U., spoke re. mercury and DDT, etc., as pollutants in the ocean, of heavy metals (lead, etc.) generally in our oceans -- how they're increasing in conc., how they accumulate through a food chain, etc.

5/26/72: Prof. Charles Ross, (retired O.S.U. forester) spoke re. recent history of population growth, present and future "explosion", necessity for control and consequences of too-rapid growth.

5/30/72: John Thompson, of Georgia Pacific, spoke in defense of their anti-wilderness bias -- and defended clear-cutting, etc.

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Field Trips, Human Ecology

3/6/72: Environmental Protection Agency. Mr. Don May showed the procedures for testing water quality, for purification of municipal water, etc. Kids were shown around the facility where testing is being done.

3/17/72: Silver Creek Falls State Park. Hiked 8 beautiful miles through canyon and saw the splendor of the several large falls, the river, the lush foliage and many species of animal life. An Appreciation trip! (8 a.m. to 4 p.m.) Picnic in sun on grass!

4/19/72: Yaquina Head (4 miles north of Newport) for tide pool exploration and general nature appreciation. Very successful!

Films Scheduled — 1/20/72
Human Ecology — Whitney

1/26 DDT: KNOWING IT SURVIVES US, 30' color; Why DDT is a dangerous pollutant. The effects on wildlife, environment in general, and on man. How the use of chlorinated hydrocarbons as pesticides anywhere in the world affects men and animals at great distances. XEROX 1969 (Pesticides) *

2/2 MULTIPLY & SUBDUE THE EARTH, 68 min. color; Problems caused by unplanned use of the natural environment. How wise land use planning based on ecological studies is necessary if the expected population growths are to be accommodated. The need for zoning based on these studies. Quotes authorities Ian McHarg, Alfred Heller, and Narendra Juneja. WGBH NET 1969 (Natural resources Land). *

2/8 SOILED FRONTIER, 27 min. color; An environmental report on the state of Oregon. Sources of pollution in various sections of the state. The individual's responsiblity. FCO OEQ 1970 (Pollution Oregon)

2/16 WHO KILLED LAKE ERIE, 53 min. color; Man's pollution of his environment. Panorama of a once lovely lake now clogged with industrial waste, raw sewage, dead wildlife, and litter. Responsibility of industry, government and the individual citizen to control pollution. Questions whether science and technology can control its own abuses NBCEE 1969 (Air-Pollution Water-Pollution Refuse and refuse disposal)

2/25 AMERICAN WILDERNESS, 51 min. color; Life style of the wilderness. Wilderness as a natural and essential resource. System for preservation, especially Wilderness Act of 1964. Threats to

AMERICAN WILDERNESS, continued: *
wilderness. Includes scenes from Yosemite National Park, Hells Canyon, French Pete, Eagle Cap, and other wilderness areas in Washington, Florida and Minnesota. NBCEE 1970 (Wilderness areas Natural resources)

2/28 JAPAN: ANSWER IN THE ORIENT, 30 min. color; Population problems series #2. How the interest of large Japanese industries in abortion and fertility control measures, legalized abortion, and the trend among Japanese people to marry at a later age in life have helped the Japanese people balance births with deaths. NET 1966 (Population Japan)

3/7 POLLUTION IS A MATTER OF CHOICE, 53 min. color; White paper series. What kind of livable environment can we manage in a technological society? Conflicts between needs and desires on one hand and methods of achieving them on the other. Examines Machiasport, Maine, Miami, Florida, and Gary, Indiana. The nuclear power plant dilemma. NBCEE 1970 (Population)

3/13 1,000 CRANES: CHILDREN OF HIROSHIMA, 24 min. B&W; The ancient Japanese belief that the folding of 1000 paper cranes will provide protection from illness. How the children of Hiroshima continue to fold paper cranes in a futile effort to ward off the unpredictable after-effects of exposure to radiation. Visits the Folded Crane Club, an organization encouraging working for peace. FLEET CCM 1968 (Children in Japan Peace)

3/27 LET'S GET WET, 26 min. color; American way of getting wet, including boating, rafting, surfing and swimming. Changes in America's water resources. Conservation practices. GROENG 1967 (Water conservation Boats and boating)

4/3 NOISE: POLLUTION OF THE ENVIRONMENT, 15 min. color.

4/13 THIS IS MARSHALL McLUHAN: the medium is the massage, 53 min. color; Exponent of 20-century communication-involvement theory explores the age of electric technology, the demands of television (especially in color) on the viewer, and the changes required in education to meet the challenge of new media. NBCTV MGHT 1967 (Audiovisual education Television McLuhan, Marshall Education-Experimental methods)

4/20 HUNGER IN AMERICA, 51 min. color; A study of various groups of people who go hungry in the U. S. every day. Conditions are documented among the Mexicans in San Antonio, tenant farmers near Washington, D.C., Navajo Indians in Arizona, and black share-croppers in Alabama. CBSTV CAROUF 1968 (Poverty)

4/24 TRIP FROM CHICAGO, 25 min. color; 21st century series. Some of the possibilities for transportation to be used in the 21st century. Increase in speed, the problem of entering the central city, the high level of noise created by takeoffs and landing of aircrafts, and the use of hover-crafts. CBS McG-H (Transportation Twenty-first century)

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5/3 CITY: CARS OR PEOPLE?, 28 min. B&W; Lewis Mumford on the city series, #2. The problems of transportation versus people in the city. The importance of making the city accessible for meeting and mixing without allowing transportation to make it uninhabitable. The threat posed by the increased number of private cars in the city. CanNFB Sterling 1964 (Cities and towns Traffic Engineering) *

5/8 PASS CREEK, 10 min. color; The impact of logging practices on streams and their steelhead trout populations. An elequent appeal for multiple-use of forest lands. Focuses on Oregon's North Umpqua River SNIRIN OSUFW 1968 (Natural resources Umpqua River, Oregon Trout)

5/8 BRAZIL: THE GATHERING MILLIONS, 30 min. B&W; Population problem series, #3. Overpopulation in Brazil and the attendant unemployment and shortage of housing and food. Effects of extreme poverty and the possible solution by means of birth control. NET 1965 (Brazil Population)

5/15 FOOD CRISIS, 60 min. color; Changing world series, #13. Contrasts the areas of the world where there is an abundance with the areas where starvation is a way of life. The pattern which has led to the lack of an adequate food supply in underdeveloped nations: lack of population control, lack of good farm practice, problems of drought, and problems of distribution. History of food crisis and attempts at solution. NET 1966 (Food Supply Underdeveloped areas)

5/22 AUTUMN ACROSS AMERICA, 50 min. color; We need each other series. A natural history of autumn in America. The inter-relationship of all living things. Scenic beauty, wildlife, extinction of species, pollution, and population pressures. XEROX 1970 (U.S.--Description and travel Canada Autumn Natural history)

5/30 WANDERING THROUGH WINTER, 50 min. color; We need each other series. A 20,000 mile journey from Silver Sands, California, to the extreme northeastern corner of the U. S. in winter. Scenic beauty, wildlife, extinction of species, pollution and population pressures. XEROX 1970 (U. S.--Description and travel Winter Natural history)

6/5 NORTH WITH THE SPRING, 52 min. color; We need each other series. Follows spring on a 17,000 mile journey..... XEROX 1970

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* The film summaries in this report are reprinted from Educational Films and Tapes, 1971-72, by permission of Audiovisual Instruction, Division of Continuing Education, Corvallis, Oregon.

A+

This is beautifully written, well organized & strongly supported by your collection of materials. I am impressed.

Jack W.

# THE POPULATION PROBLEM

Barbara McKitrick
Human Ecology
Jack Whitney
March 16, 1972

# THE POPULATION PROBLEM

Man is a being who perpetuates his race through biological reproduction. Equilibrium is maintained when the death rate equals that of the birth rate. It is estimated that the human population of 6000 B.C. was about five million people. About 1650 A.D. the population was roughly 500 million. This means that the population doubled about once every thousand years. It reached a billion people around 1850, doubling in two hundred years. Eighty years later, in 1930, the population doubled again. The next doubling of the world's population to four billion people has not yet taken place. However, we are now well over three billion in numbers. It has been estimated that at the present rate of growth, the doubling time for the world population is about thirty-seven years.[1]

There are many different factors which contribute to the gargantuan growth in human population. One of the main reasons and probably the factor which governs all other contribution factors is man's technological advancements. These advancements range from the first digging tool which primitive man devised when changing from a hunting to an agrarian society, to the development of nuclear-thermal energy and space flights to the moon. In short, the more advanced man becomes, the more he uses his mind instead of his hands to dominate his surroundings, the more unreachable he is by natural hazards which would keep his death

rate at a stable level. The higher the level of technology, the lowerthe death rate. This in itself is not the cause of over-population. Man has over-inhabited his domain because while lowering his death rate, he has neglected to lower his rate of birth.

It is instilled in the nature of man to procreate his own species. In days of long ago, when half or more of human offspring did not live to puberty, it was necessary for a couple to have six, eight, sometimes as many as twelve or more children. Life expectancy at this time was short. Through the thousands upon thousands of years, it has become the instinct of man to have large families.

No longer does man require so many children. Especially during the last century, the death rate among infants has dropped sharply, and life expectancy has been raised a great deal. With the transition from an agrarian to an industrial world, people find it not only undesirable, but a true financial burden to have many children. Yet, we continue to have babies as if we were living in the Middle Ages.

Consequently, there are too many people on the earth to maintain the quality of life desired by so many. The rapidity of the growth is such that there has been no effective method of organization to handle the problems created by such a huge population. The drain placed upon all the earth's faculties is beginning to take its toll. Millions of people are starving, our air, water and soil are being poisoned, our wildlife is becoming

extinct, our resources are depleted. We wallow in our own filth. Not only has our physical existence suffered, but the mental and spiritual attitude of man has changed drastically through the years. Our social structure has become chaotic. We turn against our own kind in war, crime, and racial prejudice. In the last few decades, man has been searching for a part of him lost. We have become a people without identity or destiny. People of today search the depths of their souls in agony for a purpose of existence, for an identity of self. Through adaptation to a crowded and chaotic life, man has lost a very important feeling of unity and purpose with nature, a nature he can no longer see because under man's rubble and dumps of waste it is dying.

Throughout the world man is beginning to realize that the present situation cannot continue on it's present course. Either we must reorganize our patterns of co-existence with ourselves and with nature, or we must radically change our physical numbers, or more preferably, a combination of the two. A world-wide recognition of growing population and related problems is taking place. Action is being taken in an attempt to remedy the situation. As with all social reform, this is a very slow and blunderous operation. Overpopulation and related problems are relatively new to man, especially on the scale at which they exist today. There is no single answer or remedy; there is no single problem. All we can do is think, move with great caution, and try.

This paper will attempt to show the method by which one community, Corvallis, Oregon, is dealing with the world-wide

human problem of over-population. Neither Corvallis nor Oregon is plagued with the intensity of over-population and related problems which exist in, for example, the urban centers on the Eastern seaboard. However, people who are aware of the problem realize that the problem exists everywhere. It is no longer a problem exclusively of urban centers. Small, relatively untouched communities like Corvallis are population time bombs ready to explode at any future date, a date in the near future if preventive measures are not applied now.

At present, there exists in Corvallis three service organizations which deal directly in the community with educational and medical services.

The Benton County Health Department is one branch of the county government supported by local and state taxes. It operates a Family Planning Clinic which is under the direction and supervision of the County health officer and the nursing staff. (see accompanying material)

The Family Planning Clinic is a facility which offers public education, private counseling and medical attention is given the recipient. Contraceptive devices are available free of charge. All contraceptive methods are medically approved and used under a doctor's supervision. Recipients are required to return to the Clinic at various intervals for a checkup. Abortion counseling and referrals are available. All records are kept strictly confidential. Under present law, the Clinic cannot treat anyone under fifteen years of age without parental consent.

Public education in the form of lectures given by Clinic personnel is available to the community. The Clinic also holds classes in family planning. A wide variety of literature is available. ( see attacted material) The Clinic is run on a volunteer basis for much of its clerical help and some of its professional medical help. At present, three physicians from the community rotate and offer services one a week for a period of one month. Currently two registered nurses from the Public Health Dept. are in attendence during Clinic hours.

Planned Parenthood of Benton County is part of an international organization which is active in forty-three countries. Its purpose is to educate people to responsible family planning and to make available to all people safe, effective, and practival means of birth control. Planned Parenthood in Corvallis works directly with the Family Planning Clinic, providing volunteers, support, and informational aids. It helps to institute the support of social service agencies in spreading information about Family Planning centers.

Planned Parenthood of Benton County presently has two plans of action in Corvallis...the support of the Family Planning Clinic and a system of public education. It will provide speakers and birth control information to any interested parties.

In 1971 one of its major efforts was the organization and presentation of a workshop in human relations and sex education for teachers of the Corvallis public school system. Several sections of the workshop dealt directly with the problem of over-

population. Other sections dealt with the nature of families in the future. An encouraging aspect of the workshop, apart from the fact that many teachers attended, was the enthusiastic support from professional people in Corvallis who volunteered to speak and lead. This indicates a growing realization that problems of sex and over-population deserve attention. 2 ← Barb, you really are "on the inside"!

The over-all purpose of the workshop was to encourage the implementation of a solid sex education program in the Corvallis public schools. (see attached material)

Zero Population Growth is a political action organization whose purpose is to bring about population stability in the United States by 1980 through public education and political education. Its efforts are concentrated on political lobbying and campaigning. It has chapters throughout the United States and very recently a chapter was opened in Corvallis.

On the Oregon State University campus which is located in Corvalis, is the Student Health Service. It is funded by state and tuition money. It is open only to O.S.U. students and as part of its services it offers counseling, medical services, and contraceptive information free of charge. It is comparable to the Family Planning Clinic in its services, except it is available only to university students and its objective is not family planning or population control. It exists solely as a medical service to students.

The university has some educational services along the lines

of birth control. The Department of Family Life has sponsored a Workshop in Sex Education. ( see attached material) This is an example of what can be done and what is being done through higher education facilities. Another public aid is the O.S.U. Cooperative Extension Service which offers speakers on sex education and family life to interested groups throughout the state.

To my knowledge there is no major effort placed on population and birth control in the Corvallis public schools. The Human Ecology class at Crescent Valley High School, and this study, is an example of what can be done through schools to promote a deeper understanding of the individuals' role in world population. I agree! J.W.

Added to the information file in the back is a copy of various Bills which were under discussion in the Oregon Legislature in 1971. These Bills do not directly concern over-population, but they indicate growing concern in family life and human relationships.

For practical purposes, there exists in Corvallis only one functioning service agency open to the public, the Family Planning Clinic. Even this is available only to low income families. Lower middle-class and middle-class families must seek birth control information and aid from their private physicians, which in many cases is too costly. Corvallis must take additional steps for effective community service and to adequately meet its responsibility to the world-wide population crisis.

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The Family Planning Clinic is understaffed and underfunded. It is too small to meet the demands of the community. It must be expanded. In order to accomplish this, the people of the community must take political action. We must lobby for more state and local funds. We must make our needs known and felt. This job should not and cannot be done by a mere few; it is the community as a whole that will get action.

A comprehensive sequence of sex education courses should be made mandatory in the public school system. It should begin in the grade schools and incorporate, according to age and understanding, matters relevant to students. This includes sex education, family relations, personal relations, birth control information, biological, moral, and religious aspects of family planning. This could be very effective if incorporated with ecology and environment, and used in relation to other academic courses.

I hope we can achieve this very soon. G.H.

Removing income tax deductions for more than two children would be an added incentive to reduce the size of families. The more financially burdensome large families become, the fewer the number of people will plan large families.

As was stated above, it is not just a few people who will make such a program work. It is the combined effort of all the people. Becoming active in environmental groups should be greatly encouraged. This would be a self-perpetuating form of public education - one necessary aspect of any community program, public awareness.

The problem of over-population is very involved and complex. I believe that most of the world problems of today are either caused by or related to, in some way, the population crisis. Man has taken it upon himself to dominate and control worldly forces. He has forcefully attempted to master nature. He has led himself to believe that he is the supreme living creature; man and man alone is important. As a consequence, the natural life other than his own, which once surrounded him in abundance is rapidly dying. The natural course of things has been so altered that man himself is dying.

Yes I agree. J. W.

Is it too late? Has man crossed the point of no return? I, for one, do not believe this to be true. I cannot forsee the complete annihilation of life as we know it by the hands of one family of being, the family of man. I look to the day when man will once again realize his role as a human being. I wish for men of the future to learn from twentieth century mistakes. To record as history the disaster which careless reproduction can bring. Man shall someday live in peace and harmony with himself and all creatures of the family of living beings.

I share your wish, Barbara — although I cannot be so sanguine in my expectations. Let's hope you're right & I'm wrong.

Jack W.

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## NOTES

1. Ehrlich, The Population Bomb

2. Information obtained from an interview with Mrs. McKitrick who is a member of the Board of Planned Parenthood.

# SCIENCE AND SOCIETY

Spring, 1972
Jack Whitney

Study and discussion of current dilemmas society faces as a result of scientific or technological progress. Such issues as these may be considered: The morality and humanity of organ transplants; the world's population explosion, efforts to control it, and religious objections to such efforts; the quality of medical care now possible contrasted with its distribution according to wealth; increased food production, pest control, increased power production, and the environmental hazards involved in each. Average or better reading skill required.

JW:jf

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# SCIENCE AND SOCIETY

Spring, 1972
Mr. Jack Whitney

Objectives:

I. Each student will show a thorough understanding, in two areas, of:

   A. The specific scientific and technological advances which created major social problems. (For example, the threat of total human annihilation in a third world war is the result of advances in nuclear physics and rocket technology; biochemistry and pest control technology team to threaten wildlife, etc.)
   B. The chronology of developments for his two topics.
   C. What ethical, moral, economic, political and psychological questions are relevant to the topics.
   D. How his subjects of investigation are perceived by those who have studied them. Scholars from several disciplines should be consulted through their writings. (For example, someone studying the dilemma posed by atomic weapons, should learn how the subject is viewed by military strategists, theologians, nuclear physicists, philosophers, etc.)

II. All class members will analyze and explain their own ideas and feelings related to the two topics chosen for study. This objective can be met only by examining one's personal world - view (i.e., philosophy). Self-knowledge is a desired - and inevitable-by-product of this analysis.

III. Every student will:

   A. Present orally to the other class members the results of his research, and his own judgements. He will head the group in discussion of his topics.
   B. Bring one or more guest speakers to talk with the class on a topic he is studying, or,
   C. Plan a field trip which will help the entire class understand one of his subjects for study.
   D. Participate fully in activities designed for the whole class; e.g., guest lectures, field trips, group discussions, films, etc.
   E. Produce research papers on both topics examined.

Evaluation will be a matter of the instructor's judgement of the student's success in meeting the course objectives listed above.

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A Few Possible Research Topics

The Quality of Life in a Technological Society
Changes in Transportation
Organ Transplants
Computers and Men
Automation
Changes in Agriculture
Mass Media
Genetic Manipulation
Eugenics
Behavior Control
Mass Production: Blessing or Curse?
Pure Research vs. Technology: How Much of Each Do We Need?
National Priorities for Science
How Much Government Control
Atomic Energy and Weapons
Atomic Energy for Peaceful Uses
Environmental Law
Responsibility of the Large Corporation
Overfaith in Technology - The Views of Scientists and Non-Scientists
Speed, Affluence, Social Mobility: Can Man Adapt?
Drugs, Disease and Microbes
The Scientist's Responsibility to Society
Control of Population Growth
The Science and Technology of War
The Politics of Science
Science and Religion
Whose Values? Whose Morality?
Man's Right to Manage the Earth

Please recognize that the topics listed here are only examples. Your own ideas will very possibly work out better. Also, notice that many listings are too big to be topics for a signle research paper. "Mass Media", for example, would not be a suitable title for a paper, but "The Effects of Television Advertising on Technologic Growth" could be. (The more I look at it, the more I realize the values of a rough draft! But, you get the idea. Right?)

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## Speakers, Science and Society

2/18/72: Guest speaker, Alan Anderson, officer in local ZPG chapter, spoke about the seriousness of the population explosion and discussed possible solutions.

4/28/72: Dr. Thompason, O.S.U. insect pathologist, spoke to the class regarding biological controls being developed to replace insecticides.

5/10/72: Jerry Colonna, C.V.H.S. natural history teacher, spoke to the class re. his concern for wilderness. He was able to get students to express their feelings about the need (or lack of it) for wilderness.

5/11/72: Bill Johnson, student teacher and arden "Sierra Clubber", spoke to the class about Sierra Club and its many political efforts to preserve wild areas.

## Field Trips, Science and Society

3/10/72: Marine Science Center of O.S.U., Newport, to learn something of the research efforts in progress there re. pollution. And, the beauty of marine organisms could be observed.

3/17/72: Silver Creek Falls State Park. Hiked around and through (behind) several beautiful falls on an 8-mile trail.

5/17/72: Tidepool area on beach near Newport. Primarily an appreciation trip.

## Films Scheduled
## Science & Society

1/26/72: FUTURISTS, 25 min. color; 21st century series. The physical, social and economic forces which have contributed to world civilization and those facing mankind today and in the foreseeable future. The impact of science and scientific method on the future. Man's capacity for adaptation to the future. CBS McG-H 1967 (Civilization Twenty-first century)

2/2/72: MULTIPLY & SUBDUE THE EARTH, 68 min color.

2/11/72: POPULATION ECOLOGY, 19 min. color; Biology program, unit I: Ecology. Factors which limit the growth of plant and animal populations in their natural environment. How man's success in shaping his environment has affected the growth rate of human population. The population explosion. EBF 1963

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POPULATION ECOLOGY, continued:
(Population Ecology Adaptation (Biology) Man - Influence of Environment)

2/9/72: AUTOMATION: THE NEXT REVOLUTION, 28 min. color; The potentialities and dangers accompanying the rapid growth of machine labor. Includes interviews with secretary of labor Williard Wirtz and others. Short version of Automation. CBS McG-H 1965 (Automation)

2/14/72: WHAT ARE WE DOING TO OUR WORLD?, 52 min. color; 21st century series. Ways of conserving our natural resources. Considers air pollution, the population explosion, land usage, waste disposal, and insecticides. Defines ecology. The ecological problems of the Everglades, Aswan Dam, the Panama Canal, and other places. CBSTV MGHT 1969 (Natural resources Pollution)

2/25/72: AMERICAN WILDERNESS, 51 min. color; Life style of the wilderness. Wilderness as a natural and essential resource. System for preservation, especially Wilderness Act of 1964. Threats to wilderness includes scenes from Yosemite National Park, Hells Canyon, French Pete, Eagle Cap, and other wilderness areas in Washington, Florida and Minnesota. NBCEE 1970 (Wilderness areas Natural resources)

2/28/72: COMMIT OR DESTRUCT, 30 min. B&W; Legacy series, #10. The daily life of the Kluge family in a town depending upon Vandenberg Air Force Base for its existence. The bizarre relationship between normal everyday family life and the responsibility of Kluge's job concerned with launching rockets, a job which may someday determine whether or not Western civilization will survive. NET 1965 (Civilization)

3/7/72: POLLUTION IS A MATTER OF CHOICE, 53 min. color; White paper series. What kind of livable environment can we manage in a technological society? Conflicts between needs and desires on one hand and methods of achieving them on the other. Examines Machiasport, Maine, Miami, Florida, and Gary, Indiana. The nuclear power plant dilemma. NBCEE 1970 (Pollution)

3/15/72: CBW: THE SECRETS OF SECRECY, 47 min. color; How silent, microscopic killers sprayed from planes or poured into water supplies could wipe out whole populations. The weapons of chemical-biological warfare: plague, anthrax, nerve gas, and rabbit fever. Includes interviews, footage of accidental sheep deaths in Utah, and scenes at British and Canadian CBW facilities. NBCEE 1969 (Biological warfare Chemical warfare)

4/3/72: SUPERFLUOUS PEOPLE, 54 min.B&W; presents the moral as well as material problems of welfare aid. Documentary filming and interviews show orphaned children, teenage school dropouts, elderly persons, families on relief--the attitudes and problems of these "superfluous people" in our society. Thoughts of social workers, clergymen, authors, educators, and city

SUPERFLUOUS PEOPLE, continued:
planners who are concerned with society's neglect of these people. CBS McG-H 1962 (Public welfare City planning)

4/13/72: THIS IS MARSHALL McLUHAN: the medium is the massage, 53 min. color; Exponent of 20th-century communication-involvement theory explores the age of electric technology, the demands of television (especially in color) on the viewer and the changes required in education to meet the challenge of the new media. NBCTV MGHT 1967 (Audiovisual education Television McLuhan, Marshall Education--Experimental methods)

4/19/72: ABORTION AND THE LAW, 54 min. B&W; The legal moral, social and psychological aspects of abortion in the U. S. Presents clergymen, lawyers and physicians who hold opposing views and tells of specific cases of abortion. Includes a summary of the problems, attitudes and legal aspects in England, Sweden, Poland, Chile, Mexico and Japan. CBS Carousel 1965 (Abortion)

4/24/72: TRIP FROM CHICAGO, 25 min. color; 21st century series. Some of the possibilities for transportation to be used in the 21st century. Increase in speed, the problem of entering the central city, the high level of noise created by takeoffs and landing of aircrafts, and the use of hover-crafts. CBS McG-H (Transportation Twenty-first century)

5/3/72: CITY: CARS OR PEOPLE? 28 min. B&W; Lewis Mumford on the city series, #2. The problems of transportation versus people in the city. The importance of making the city accessible for meeting and mixing without allowing transportation to make it uninhabitable. The threat posed by the increased number of private cars in the city. CanNFB Sterling 1964 (Cities and towns Traffic engineering)

5/10/72: TROUBLED CITIES, 60 min. B&W; America's crises series, #17. The crises of American cities. Report on the attempt of four metropolitan areas--New York, Detroit, Boston and Newark--to solve their growing social and financial problems including inadequate housing, low standards of living, racial tension, and crime. NET 1966 (Cities and towns Population)

5/17/72: COMMUNICATIONS EXPLOSION, 25 min. color; 21st century series. The world of the 21st century with particular reference to patterns of communication and their projected impact upon man. Research and technology in the area of communications. CBS McG-H 1967 (Communication Technology Twenty-first century)

5/22/72: AMERICA ON THE EDGE OF ABUNDANCE, 54 min. Color; Intertel series, #23. The economic and social consequences of the increasingly automated and computer-oriented society in the U. S. as viewed by the British. Leisure as a business. Rediffusion NET (U. S.--Social conditions Automation)

5/30/72: ANATOMY OF A HOSPITAL, 54 min. color; White paper series. The hospital as an institution in the lives of Americans. The interns and resident physicians; the rising costs of medical services and other problems. Views of hospital personnel and patients, staff meetings, the sessions of a committee that checks on surgical procedures, and a meeting of the city council discussing the hospital budget. NBC McG-H 1961 (Hospitals)

6/5/72: MAN-MADE MAN, 25 min. color; 21st century series. Modern developments in the area of vital organ transplants and artificial organs. The progress that has been made and the problems yet to be solved. CBS McG-H 1967 (Transplantation of organs, tissues, etc. Artificial organs Twenty-first century)

6/8/72: WAR, 22 min. color; a documentary on the futility of war as revealed in a dialogue between a soldier and a group of children. History of armed conflicts of man from prehistoric times to the atom bomb. Uses paintings, stills, woodcuts and newsreel footage. CCM 1968 (War)

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# THE EFFECTS CAUSED BY THE OPERATION OF NUCLEAR REACTORS AND THEIR CAUSES

by Bill Rickham

I selected this topic because I believed it would be easily researched. I was wrong. Information on this topic is plentiful, but too often contradictory. I will deal with a number of factors, I can only hope to have covered them all.

## Radiation Leakage

In England, at Windscale Pile #1, on October 7, 1957, equipment and personnel malfunction resulted in an accident.

Thermocouple malfunctions cause the people to doubt the accuracy of new ones and replacements.

Graphite, used in the reactor as a neutron moderator (to slow down neutrons so they may be more easily absorbed), often absorbs the radiation to be 'stored' and released later, as heat.

The reactors in England, found the energy uncontrollable. The fuel rods melted, and reacted with air, burning away the uranium as a vapor spreading across England and into Europe. The fire was stopped by flooding with water almost as dangerous because of a possible explosion. However, it would at least stop the burning.

There was no explosion. Books emphasizing the negative side of nuclear power cover this in more detail, books on the positive side cover the government actions showing that the government can prevent radiation sickness. Both sides are biased by emphasizing what's good for their own case, and bad for the opposition.

Numerous authors cite reactor accidents, many at commercial plants. I have never trusted commercial enterprises, they are too greedy. Only strict laws can force their compliance with regulations. Industries seem to think: If it's cheaper to poison the public, to make more money, it's all right.

At some reactors, like the Enrico Fermi reactor (commerical, fast breeder, sodium cooled), installed emergency zirconium shielding. The shielding was poorly attached to the reactor. The shielding was supposed to catch the liquid uranium, if it were to melt. When the coolent flow is stopped, the uranium will start to melt, and gather as a molten mass at the bottom of the containment or reactor shell. This is the 'China Problem'; the molten mass might melt its way to China. (I doubt it would get all the way to China, but it sure would make a big hole.) In the Fermi reactor, the zirconium shielding blocked the coolent flow when it came loose.

Reactors in California are not very well liked for the possiblities of radiation release by earthquakes. I don't believe any reactor should be located in a known fault area. Some people object to placement in unknown fault areas, but since they are unknown we don't know where they are, and we can't relocate reactors on these. Any place we locate a reactor, could be an earthquake zone.

Some coolent in the reactors may be radioactive, but since this is usually a closed system, this water is not released.

In some plants, according to The Careless Atom, separated waste gases from the water are exhausted into the air. I find it hard to believe the A.E.C. would allow this. It seems apparent however, that if anything ever came of it, someone would plot or calculate any increase in disease near the plant and blow the whistle. Certain limits are set for radioactivity and no changes have been noticed. Some of the gases released here are inert and cannot be absorbed by the body, only the readiation would be dangerous, and this would (as stated above) cause no noticesble change.

When fuel rods have been used up, they are removed and placed in a pool of water for cooling, and to allow some dangerous elements to decay. The fuel is reprocessed in a long and careful process. Useable uranium and plutonium are prepared to be recycled. (I will deal with waste disposal in another section.) These

processes cause no real problem. The transportation is bad. Some accidents have occurred from or during shipment. Shipments to and from the plants have been lost, and in a few cases caused deaths. In one incident a small boy found a number of pellets of plutonium (lost). Not knowing what they were, he took them home, and played with them. The container was found in the home on the mantel above the fire place. All residents of the house died.

Biologists, according to one very reliable authority, generally agree that any radiation may be accountable for birth defects, leukemia, etc. For the last few years medical people have avoided x-rays where not needed. Radiation is known to cause changes in the genetic makeup of organisms. As long as the changes are small, they may help evolution, or even be regarded as part of evolution. Increased radiation may result in large changes, and threaten life's continued existence in this world. I believe, however, at our present rate, we will be in bad shape before too long, and we must watch it. Only a watchful eye can protect us.

## Explosions

Although many authors opposing reactors tell about near accidents, no explosion of a reactor has occurred.

It is conceded that a runaway nuclear plant will not result in the large, destructive nuclear blast. It may, however, result in a different kind of explosion.

When the coolent melts and flows to the bottom of the containment chamber, it heats up rapidly (if there is enough mass), and releases more poisonous gases than usual. As the heat rises, so does reactability (with air, and various available elements and compounds). This would cause the explosion.

A nuclear explosion cannot happen because the uranium isn't sufficiently enriched. At San Onofri (near San Clemente), the uranium is enriched approximately 3.5% where a nuclear bomb requires closer to 90%. The first nuclear reactor built by Enrico Fermi, used unenriched uranium, where the atomic bomb required enriched uranium.

As I mentioned before, the explosion may break the containment vessel used at some reactors, and probably that of the uncontained reactors too. This would spread a cloud of uranium gases, and also the normal fission products. This is a large radioactive cloud and will result in great numbers of deaths, injuries, and an increase in radiation affected or produced diseases, if it is confined in an area.

The English accident released 1/10 the radioactivity of Hiroshima, but it was spread out lightly over Europe. I know of no deaths as a result.

Experienced personnel have prevented accidents so far, and the commercial plants know they couldn't afford an explosion. I don't believe we will have an accident of any size for a long time.

## Radioactive Waste Disposal

Fresh uranium fuel can be safely held in your hand. It is cool, and can't hurt anyone except for long exposures. Nuclear waste products are often too hot to handle in more than one way. The waste products could be absorbed by the body. Iodine, potassium, and tritium could be absorbed, causing damage. These wastes will be separated from the remaining usable uranium, further concentrating them. Such wastes have been stored in the Northwest in liquid form at Hanford, Washington. Solid form would be better. Liquids can be easier absorbed by the ground and find it's way to rivers easier than solids. These deadly liquids must be constantly cooled to avoid boiling, evaporation, and resultant breakage of containment vessels. Some wastes must be stirred to avoid solids precipitating out and producing hot spots in the tanks.

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In this case, the conflicts of data I received became apparent. Some authorities said tanks must be replaced every twenty years while others said ten. Tanks must be replaced they said for the next 30 centuries while others said from 500 - 1000 years.

Numerous plans have been suggested for the diposal of these wastes. Some suggest purping the liquid waste with a solidifying agent into holes and gaps in bedrock, usually artificially produced.

Another plan (in effect, I believe) is to solidify wastes, place them in cans and bury them in the dry salt caverns of the plains and mid-west. This method is good for solid wastes too. Some people suggested sending these wastes into orbit. Just wait till it re-enters (this killed it). It was a very expensive idea too. Ocean storage was too dangerous.* Underground storage appears to be best. It sits the wastes off from the environment and gets them out of our responsibility. As it is, any disaster causing a loss of people who know how to service the Hanford tanks (World War, disease, etc.) would result in the loss of these dangerous chemicals, and probably finish off any survivors at the first disaster.

S. Novick brought up an idea of some merit. He suggested we store wastes near the plant. This would result in fewer dangerous shipments from these plants. Since most plants are on bedrock, it would be possible. But it would probably result in the end of atomic recycling, as it is an expensive process for one plant to maintain. (Most plants replace fuel every 2-4 years, resulting in maybe 40 tons over this time.) A central processing plant for several stations might be feasible. This appears to be a good compromise.

Gaseous wastes do present a bad problem. I don't believe I have seen, heard, or read anything about them in a waste solution. If they could be compressed and buried in bedrock, or used in a gas cooled reactor, it would solve the problem. Gas cooling use could be dangerous. Many gases are inert, and won't combine with other elements under normal conditions. They could be stored in pressurized underground tanks, but this is speculation.

## Thermal Polution

Thermal polution is not something that can only be blamed on nuclear plants. It appears to be worse for nuclear plants.

Nuclear plants are about 34% efficient as compared to 50% (approx.) for the fossil fuel plants of similar design. The prices of the equipment varies similarly. (See chart on last page.)

In each of the given cooling methods, heat is still present. It may be in the river or in the air, dry or wet, the heat is still there.

The mechanical draft coolers are cheaper than the natural draft coolers. The costs of constructing wet mechanical coolers is cheaper than a man-made lake. I assume it will soon be regulated or illegal to use the rivers and the oceans. The mechanical draft coolers require some energy to run the fan for air circulation. M. D. require more land, and are somewhat less effective than the N.D. (natural draft).

The natural draft towers occupy less room, are more efficient than other types, in large volumes of air. The N. D. requires no energy other than that of the warm water.

Dry towers are more expensive than wet towers, and loose much less water by evaporation. The wet towers releases immense clouds of evaporated water. N. D. towers move the output up in the air several hundred feet, and are less likely to produce fog and ice near the plant, but it may be about the same for the two types (N.D & M.D.) in total amount. Dry towers release no water vapor for this fog and ice. Dry M.D. towers are likely to become prevalent.

Heating lakes, rivers, and oceans, produce a number of changes in the animals. As heat increase, metabolism goes up. The blood is less able to absorb oxygen, more heat increase the chance of deformed fish and loss of eggs or failure to produce eggs,

*It moved the wastes directly to the water and environment.

lifetimes are shortened by increase temperature.

Some companies state that fish grow faster in warm water. This is true, but the warm water fish are smaller than their cold water counterparts.

Above a certain temperature, certain animals produce only females.

Eventually as the heat rises, the metabolism slows and the fish (or other animal) dies.

Use of warm water for farming, land or sea, and heating homes or swimming pools is very expensive, but possible. Some day it may become profitable if and when food becomes short in supply, or the land is thoroughly leached by man.

## Conclusions

I believe we must be more watchful of these plants, to avoid eventual poisoning of the environment.

The government should be able to control their own reactors since they are not out for profit.

Commercial reactors should be very carefully watched. They may not watch as carefully as they should.

Transportation from the plants to the reactors and back should be carefully watched, with routes ploted in case of nuclear accidents. Storage near reactors would be good.

Most reactors do not seem to have sufficient strength to contain an explosion. San Onofre shouldn't have a sphere only ½" in thickness at maximum.

Dry towers of the natural draft type would be the best cooler ecologically, except perhaps the man made lake.

Wet natural draft towers could also handle the load, perhaps easier. The natural draft tower is good because it gets the heat and water vapor higher off the ground than the mechanical draft.

MARINE BIOLOGY

Spring, 1972
Jack Whitney

Marine animals found along the Oregon coast will be examined and studied. Some field work is expected. Time will be given to study of the physical and chemical aspects of oceanography; for example, waves, tides, variations in temperature and salt concentration. Every student will be required to do a semester project. It may be a research paper, a laboratory study or the construction of models or aquaria. Four weeks of the semester will be set aside for all students to read and discuss "The Frail Ocean", a book concerned with delicate ecosystems in the sea. Average or better reading skill is required. Prerequisite: At least a semester of high school biology. Not open to students who have completed a semester of high school oceanography. This course replaces the former course called oceanography.

MARINE BIOLOGY

Spring, 1972
Mr. Jack Whitney

Objectives

1. Each student will learn:
   A. Some physical factors important to marine animals and plants; such as:
      1. Causes of waves, tides and currents.
      2. Beach formation and changes with season and weather.
      3. Basic geology of the ocean floor and the beaches.
      4. How water temperature is regulated - and how it affects the life it supports.
      5. Some fundamental chemistry of sea water, including salinity, oxygen content, types of salts present in largest amounts, why salinity changes are important to life, etc.

B. Enough taxonomy to make trips to local beaches more meaningful; for example:
   1. Names of the major animal groups found locally.
   2. Common and/or specific names for the most abundant local species.
   3. Life patterns of marine organisms, including:
      a) How they feed.
      b) What they eat and what eats them.
      c) How they reproduce.
      d) What defenses they use.
   4. The general anatomical features (structure) and physiological mechanisms (function) characteristic of central Oregon life forms.

C. General principles and some specifics of marine ecology:
   1. For organisms of the intertidal zone.
   2. For life in the open sea.
   3. Man-induced changes in marine ecosystems.

The general objectives listed above will be met through:
   1. Assigned readings
   2. Films
   3. Use of preserved specimens
   4. Field trips (Sometimes planned by students)
   5. Guest lectures (Arranged by students)
   6. Class discussions
   7. Semester projects required of each student.
   8. Research papers.

Students will be evaluated in terms of success in meeting the objectives listed above, which will be made more specific as the course progresses. Evaluative criteria will include:
   1. Written or oral tests
   2. Participation in whole-class activities; such as, discussions and field trips.
   3. Semester projects
   4. Such extra work as:
      a) Bringing a guest speaker
      b) Organizing a field trip (with assistance from the instructor, of course)
   5. Research papers - assigned or optional

## Speakers, Marine Biology

2/10/72: Dr. Robert Hodgson, O.S.U. oceanographer, spoke about physical oceanography and concentrated upon its vital role in sustaining the frail ecosystems of sea and shore. He talked some about the hazards of filling operations at Yaquina Bay and elsewhere.

2/28/72: Dr. Danil Hancock, O.S.U. oceanographer, spoke of pollution problems in the intertidal zone of the seashore.

## Field Trips, Marine Biology

3/10/72: Marine Science Center of O.S.U. at Newport. Speaker concentrated on local studies in progress re. mercury pollution and effects of pesticides on marine life.

4/19/72: Rocky tidepools near Newport. Students were encouraged to look for "links" in food chain & to make "guesses" regarding ecological relationships among organisms. An extensive discussion followed this trip.

5/17/72: Another tidepool area where, among other things, ecological relationships were studied.

## Films Scheduled
## Marine Biology

1/26/72: RESTLESS SEA, 54 min. color; Science series. A study of oceanography including the composition and characteristics of sea water, formation of tides, what waves are, the tracing and charting of currents, the circulation of sea water, plant and animal life, and new techniques of studying the floor of the ocean. Partially animated. Disney Bell 1964 (Oceanography)

2/[illegible]/72: SEA, 27 min. color; Biology program, unit 1: Ecology. Interdependence of plant and animal life, food supply, adaptability of plants and animals, rich variety of animal life, and the natural beauty and importance of the marine biome. Geography of the sea, partially in animated drawings; deep-sea explorations. EBF 1962 (Marine animals Marine plants Ocean Ecology)

2/9/72: WAVES ACROSS THE PACIFIC, 32 min. color; Earth and the sea series. Marine science series. The nature of ocean waves and their loss of energy from the time they are set in motion by Antarctic storms to their arrival on the coast of Alaska. Sites for wave stations, including FLIP, the Floating Instrument Platform in the north Pacific. MGHT 1967 (Ocean waves)

2/15/72: DEEP FRONTIER, 25 min. color; 21st century series. New techniques in exploring the ocean. Interviews six men who are among the pioneers of ocean exploration. Six newly developed devices for accomplishing missions in the depths of the sea. CBS McG-H 1967 (Oceanography Twenty-first century)

2/23/72: CONQUERING THE SEA, 25 min. color; Excellent 21st century production, CBS

2/28/72: PLANKTON AND THE OPEN SEA, 19 min. color; Biology program unit 1: Ecology. Distribution of plankton; dependence of one kind on another; how an attempt is made to determine the amount of food available at the base of the marine food chain. EBF 1962 (Plankton Ecology Marine biology)

3/6/72: PHYLA--who's who of the animal kingdom, 16 min. color; Living world of the sea series. Traces the development of animals from protozoa to chordates. Unusual specimens in the animal kingdom. REELA CCM 1970 (Zoology Marine animals)

3/9/72: PLANKTON AND THE OPEN SEA, 19 min. color

3/13/72: SPONGES AND COELENTERATES: POROUS AND SAC-LIKE ANIMALS, 11 min. color; Underwater photography features the jelly-fish, sea anemone, coral, hydra and sponges. Coronet 1962 (Sponges Coelenterates)

3/27/72: STINGING-CELLED ANIMALS - coelenterates, 16 min. color; Biology program, unit 3: Animal life. Three class of coelenterates: Hydrozoa, Scyphozoa, and Anthozoa. Characteristics and feeding habits of stinging animals; reproductive cycles. Microscopic examination of the stinging apparatus. EBF 1962 (Coelenterates)

4/3/72: WORMS-THE ANNELIDA, 13 min., color; Annelid classification and variations. Importance of these animals to man. EBF 1955 (Annelida)

4/10/72: HOMELY MOLLUSK--Octopus vulgeris, 13 min. color; Living world of the sea series. Life cycle and physical characteristics of the octopus. Feeding habits. Defense mechanisms, including ability to change skin color and paralyze attacker's sense of smell. Includes an attack by its mortal enemy, the moray eel. REELA CCM 1968 (Octopus)

4/17/72: ECHINODERMS, 13 min. color; the five classes of echinoderms. The general characteristics and external anatomy of each class. Dissection of a starfish provides a detailed study of the anatomy and function of the digestive, reproductive and water vascular systems. Information on food getting, locomotive and regenerative aspects of the starfish. McG-H 1965 (Echinoderms)

4/17/72: REPRODUCTION IN THE SEA URCHIN, 13 min. color; uses closeups and photomicrography to illustrate the physiology of the sea urchin's reproductive system. Follows the reproductive process through the primary stages of cell division and embryonic development. Coronet 1965 (Sea urchins Reproduction)

5/1/72: WAY OF A TROUT, 30 min. color; life cycle of a rainbow trout. Spawning, development of eggs to fingerlings, and the hazards of survival. A large adult trout is caught by an angler and returned to its natural element. WILKIJ TROUT 1970 (Trout Fishing Ecology Wildlife-Conservation)

5/8/72: SALMON: LIFE CYCLE OF THE SOCKEYE, 11 min. color; the life cycle of a sockeye salmon from its birth in inland waters, its maturity in the ocean, and its return to fresh-water streams to spawn and die. Importance of the salmon-fishing industry in the Pacific Northwest. HOE BAILEY 1951 (Salmon)

5/8/72: BETWEEN THE TIDES, 20 min. color; bird and sea life around the tide zones in Britain. Very outstanding scenes of underwater life. Contemporary 1958 (Birds Marine biology)

5/15/72: MARINE ECOLOGY, 28 min. color; AIBS biology series, part 9: Ecology, #6. Some limiting factors that influence distribution of plants and animals in the ocean. Characteristics pertaining to life forms, zonation, stratification, and productivity of the ocean. McG-H 1963 (Ecology Marine biology)

5/22/72: MARINE ANIMALS OF THE OPEN COAST: a story of adaptation, 22 min. color; how animals of the open coast are modified to adapt to the conditions in which they live. Considers animals of the intertidal area, the surf-swept zone, the splash zone, the protected tidal pools, and the sandy beaches. Moyer (Adaptation [Biology] Marine Animals)

5/31/72: MAN INVADES THE SEA, 28 min. color; an introduction to oceanography. International scientific explorations of the oceans. The new ways of probing the sea. ABC McG-H 1965 (Oceanography)

6/5/72: ATTACK PATTERNS OF SHARKS, 30 min. color; Experiment series, #1. Experiments performed by Dr. Perry Gilbert of Cornell University to ascertain if the shark is directed by its sense of smell or sight when making an attack. Uses live sharks at the Lerner Marine Laboratory at Bimini, Bahamas. Prism NET 1966 (Sharks)

Project - Crescent Valley High School

by Randy E. Wilkinson

My field experience project for School in American Life took place at Crescent Valley High School. The teacher with whom I worked is Mr. Jack Whitney. I was principally involved in the Science and Society class, although some of what I did also was used in the Human Ecology class. The class dealt with the social impact of science and technology. This includes topics such as ecology, environmental issues, population, and automation. Almost any controversial subject is fair game.

In order to handle this type of class, with its diverse topics, it is necessary that the emphasis fall on individual interests, individual projects and group discussion. The use of many and varied media was also important in the making of the class. It is fortunate that my views are very much the same as those held by Mr. Whitney, both on the subject material and on the organization of the class.

One of the media is, of course, print. Books played a very important part in the class. They served as a common starting point for discussion and a source of material for projects. One of my first tasks was to locate and catalogue the books that dealt with subjects of this class. For the most part these were books of the short paperback variety. (There was no required text for the class.) I was delighted to discover that there were more than 130 books in the school that the students could use. During the course of the term I played a small part in finding books that might be applicable to the three classes Mr. Whitney teaches.

Like books, movies are important forms of the media. Twenty films were scheduled for the eighteen weeks of class. It became one of my tasks to preview some of the movies that would be shown to the class. I did decide that some of the movies were not good enough for the class. I also did find some movies that I felt were particularly good. There are some recent movies that have been made for television that are very good and aimed at the right intellectual level.

Movies are a good way for the students to see what the problems they are discussing really are like. Another good way to do this is by going on field trips. At this writing I am planning to participate in three such trips with Mr. Whitney. The first of these trips is to the Environmental Protection Agency, on March 6. I arranged this trip, which is a deviation from the normal procedure. Normally, it is the students who are responsible for arranging for the trips and the teacher helps to conquer the red tape. The second trip is a hike around Silver Creek Falls, March 17. Hopefully this will allow the students to savor the beauty of our natural surroundings and why the "save our wilderness" causes have so many and such vocal supporters. The third trip will be the biggest and most challenging for me. Mr. Whitney and myself will be taking a very large group of students to the coast for a marine biology study (April 18).

Since in the areas of controversy there are few who can be considered as experts on all aspects, outside speakers are valuable classroom aids. Once again the emphasis is on student participation and responsibility. Each student is to arrange either a field trip or a speaker on his or her own subject of study. So far the speakers have been a great success.

Much to my surprise I learned that simulation games are an effective way to get important ideas across to students. A teacher brought in the Planet Management game one day, and it was played for several days. I feel that this was time well spent. They gained as much or more understanding of how man's actions affect the world and nature, than if the time had been spent reading, watching movies or in other more orthodox classroom activities. Perhaps the most important part of the use of games is that they are fun. Learning is a spontaneous side effect. I was also surprised to discover that creating a truly valid and understandable test is a difficult task. My first experience along this line was preparing questions for a marine biology sample test. This was not too difficult a hurdle to cross. The idea of a test that could be administered close to the beginning of the class and at the end of the year to discover what the students had learned sounded good. But, it was not easy. A forty-five question combination true/false, fill-in, and essay test was my answer. I found it hard to make up a test that was understandable, comprehensive and yet not too difficult. Since the grading philosophy of this class dictates that the grades shall be determined by the projects which students undertake, the test was not a "test". I tried to make it clear that it was simply a diagnostic device and hopefully a learning experience. To make it a valid learning experience I felt that the students should have answers to the questions. So I made out an answer sheet to be given out with the corrected tests. It is my hope that the answers are explanatory. Time is also taken in the class to explain and discuss any questions or opinions. Throughout I have tried to encourage discussion, questions and opinions. Even in its final form I am not totally satisfied that it is the best that could have been done. I am afraid that it could have a demoralizing effect, and I don't feel that these students deserve a put-down.

I also made up a second diagnostic. This one is a questionnaire dealing with Human Ecology and Science and Society classes. In making this, I tried to cover all aspects of the class in a brief space. Organization is of particular interest to me. I also will be very interested in what the students have to say about the teacher's aide. The students will be requested to complete this at the end of the school year so it will be some time before there will be any results from this.

I have left for the last what for me has been the most valuable part of experience: the students. I discovered that I really like to work with people of this age; it is quite rewarding. I have enjoyed being in the classroom more than any other portion of the work at Crescent Valley. I have been responsible for the class, but my primary responsibility to the class was to act as a resource person and help with project work. Just talking to them on subjects, both related and not related to class work, was both stimulating and interesting.

No evaluation of a project is complete without criticisms and I have a few to offer. I wish that the time did not have to come to an end so soon. It would be very valuable for me to see how the class progresses and how it will turn out in the end. Also, in the short time that I had, it is hard to really get a feeling of how all the subtle interactions are operating in the classroom. I was happy to see that many different projects had been chosen; they ranged from parapsychology to bacteriological warfare. I would like to see the end results of the students' work.

I suppose that the negative portion of this tract is the proper place to outline my failures in this project. Perhaps the one thing that I should have accomplished and did not is in the realm of projects. I had a few, but particularly original or novel ideas for escape from the time honored standard of papers as projects. For some reason I failed to bring these things to realization. I think it would have been great if some of the students had undertaken the creation of a simulation game as a project, or perhaps some experimental studies in local ecology. Unfortunately, only a few students did this type of project.

All things considered, I could not have hoped for a better experience. I learned a great deal, and I enjoyed it. The people I worked with, both students and teachers were great and I regret that I must return to the duller life of a college student. Science and Society is the type of class that so many of us have always been unable to take and wanted so badly. It is a class that was, is and will be relevant to the lives of all that have been involved. Too often class becomes too esoteric and dull but with a class of this type, it is always pertinent. I only hope that when I become a teacher my classes will also be pertinent and meaningful; I have a good example to follow.

Human Ecology &
Science and Society
March, 1972

Name_____

KNOWLEDGE INVENTORY

This is an inventory of your knowledge of environmental problems. THIS IS NOT A TEST!! So don't worry, you may not be able to answer all the questions but by the end of the course you should be able to. GOOD LUCK.

| point value | | | | |
|---|---|---|---|---|
| 1 | 1. | T | F | The Willamette Valley is potentially the second worst place in the U.S. for air pollution. |
| 1 | 2. | T | F | A living molecule (a virus) has been created in the laboratory from non-living material. |
| 5 | 3. | | | Garret Hardin wrote the "Tragedy of the Commons", explain what this principle is: |
| 1 | 4. | T | F | The wolf, like the grizzly bear, is by nature a vicious and deadly animal. |
| 1 | 5. | T | F | It has been suggested by scientists that air pollution causes lung cancer. |
| 3 | 6. | | | Why is R. Buckminster Fuller's geodesic dome a better shape for a building? |
| 1 | 7. | T | F | Organ transplants are deadly because the new organ usually fails to work at all in the new body. |
| 5 | 8. | | | What is the mathematical way to calculate the crude population growth rate? |
| 1 | 9. | T | F | The legal poverty level in the U. S. in 1971 was $2500.00 for a family of four. |
| 5 | 10. | | | In ecology, what is a "limiting factor"? |
| 1 | 11. | T | F | Water pollutants cause problems by changing the amount of oxygen in the water. |
| 1 | 12. | T | F | The goverment poured more money into cancer research than congenital child diseases research last year. |
| 1 | 13. | T | F | Twenty years are required for DDT to break down in the body of a seal. |

5 14. Explain the idea of succession as it applies to ecology:

1 15. T F Urban renewal has been effective in bettering the living environment in the city.

2 16. Which population will be larger by the year 2000?
Country A - present population 2 million, doubling time 5 years.
Country B - present population 4 million, doubling time 10 years.

2 17. Malaria is once again becoming prevalent in some areas of Africa and Asia because:
a. it is carried by a new kind of mosquito.
b. they have banned DDT because of its dangers.
c. the mosquitoes no longer die of DDT

5 18. Explain what the food chain is:

1 19. T F Fire and flood destroy the ecosystems of the redwood forests.

2 20. "Famine seems to be the last, most dreadful resource of nature. The power of population is so superior to the power in the earth to produce subsistence for man, that premature death must in some shape or other visit the human race.", was written by a man called Malthus in:
a. 1965 b. 1854 c. 1930 d. 1798 e. was written by the teachers aide.

1 21. T F The Army Corps of Engineers made the Oklawaha River into a barge canal. This caused the acidity of the water to change, but this did not change the kinds of water plants growing there.

1 22. T F There is no present method for converting garbage into a product resembling crude oil.

1 23. T F It is a bad idea to have exotic species imported into an area to be set free. (think of the walking catfish in Florida).

5 24. Kenneth E. Boulding has suggested a "Marketable License for Babies". Point out two major drawbacks to this plan.

5 25. When we study other peoples and their cultures, we have a problem with ethnocentrism. What is ethnocentrism? (hint: take the word apart)

2 26. Name two alternative engines that are being considered for automobiles.

1 27. T F There is only a thirteen-year supply of natural gas left according to present knowledge.

2 28. If Americans continue to use water at the present rate, they will need 700 billion gallons per year in 1980. This is: a. more b. less c. the same as what will be available.

2 29. Light causes some things in the air to turn brown and become irritating this is called _____ smog.

5 30. In ecology, what is the difference between a limiting factor and a regulating factor?

2 31. A man is legally dead when his: a) heart b) brain c) breathing stops (or) d) the law is not the same all over the country. e) man does not die; he is an immortal god.

2 32. One of the problems of building the SST was the_____ boom caused by _____waves in the air.

2 33. Population grows_____while food supply grows _____. (hint: use the words arithmetically and geometrically.

1 34. T F People in India are learning birth control by satellite.

1 35. T F The sea can produce more food than land. (no fantastic break-throughs during this test - okay)

1 36. T F Crowding causes social problems in mice.

1 37. T F Clear cutting is always the most damaging method of logging. (think in terms of ecology.)

1 38. T F The decline of the black footed ferrets in Wyoming is a result of farmers poisioning prairie dogs.

1 39. T F By using our life saving medical techniques and medicines, we are increasing the number of genes for genetically caused diseases.

1 40. T F The noise level in a New York subway station is loud enough to cause hearing damage.

1 41. T F In the U.S. we have less than half the suitable land under cultivation.

1 42. T F War has historically been an effective method of depopulation.

1 43. T F Some large logging companies are replanting the forests with a single variety of "super" trees.

5 44. What do we mean when we say "spaceship earth?"

45. Define:

3 a. Ecology

2 b. Human ecology

2 c. Science

2 d. Society

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100 total points

Now, that wasn't so bad, was it? Feel free to ask questions if you disagree!

JW:jf

Human Ecology &
Science and Society
March, 1972

Answers to the Knowledge Inventory

1. True — This is because thermal inversions are so common here. How many times has I-5 been fogged up near Albany? That is a thermal inversion in action.
2. True — They have been working on this for some time. It was done just last year.
3. — The idea behind the "Tragedy of the Commons" is that public property is not taken care of because no one feels responsible. Consider the air in Albany - Company A (to avoid liability) feels that they can pump junk into the air because it doesn't belong to anybody, but it belongs to everybody and everybody pays for the damage by the smell. If the company owned the air they would not mess it up, who would destroy something that he paid a precious price for?
4. False — Most animals will attack unless there is something wrong with them or they feel threatened.
5. True — It has been <u>suggested</u> it has not been <u>proven</u>. When air pollution goes up, so does the number of respiratory illnesses but this is not proof.
6. — The geodesic dome is structurally stronger so it requires less material to construct. Aesthetic reasons are a matter of opinion.
7. False — In almost all cases, an antibody reaction or secondary complications such as respiratory failure or pneumonia cause death.
8. — Crude growth rate = number of births/1000 - number of deaths/1000.
9. False — It was more in the area of four thousand dollars for a family of four.
10. — A limiting factor sets the limit on how large a population can get. Food is a limiting factor for most animals.
11. True — Many pollutants tie up the oxygen in water or let the oxygen escape from the water of a creek.
12. True
13. True — And it depends on the amount of fat tissue - how long will it take to break down in you?
14. — One group of plants and animals will move into an area and use it until a group that is better adapted to the area comes along to displace them. The last stage of this is the group that is the most varied and complex; can you think why this is?
15. False or True — This is an opinion question. My opinion is that the urban renewal is usually not designed for the poorer people that have to live there, but it is designed to be pleasing for the tax payers who live in the suburbs. As a result the poorer people are forced to move to another crumbling section of town.
16. — Country A-by the year 2002, Country A will have a population of 128 million. Country B will have 32 million. Country A doubles 6 times in 30 years so it is $2 \times 2^6$. Country B doubles 3 times so it is $4 \times 2^3$.
17. — Mosquitoes raised near a lot of DDT become immune to it.

18. A plant makes the first food from nutrients and energy from the sun. It is eaten by a herbivore. This animal is eaten by a carnivore. And the carnivore is eaten by a still larger animal. In this way food materials and energy are passed from one organism to another. In most cases we are the biggest animals.

19. False Fires and floods wipe out the other trees that threaten the existence of the redwoods. Without the fires, other trees may choke out the redwood trees, particularly the young ones.

20. 1798 - population has been recognized as a problem for a long time.

21. False Any change in the conditions effects the way things grow. The Oklawaha River is now so choked by water hyacinth that it is no longer passable to barges; it wasn't that way before the canal was built.

22. False There has been a method developed to convert one ton of garbage into one barrel of oil.

23. True Exotic species rarely have an enemy in the area that they are set free. So they reproduce in great numbers and over run the area killing or driving out all the local native species.

24. A black market in babies - licenses at least - no way to control people and enforce the law - rich people can buy more babies than the poor - a problem of equality, etc.

25. Ethnocentrism is what occurs when we study other peoples' culture and compare it to ours. We say that this or that is good or bad because it is good or bad in our culture, when really it is really good or bad as judged by their social standards, not ours.

26. Steam, electric

27. True According to the National Wildlife Federations Environmental Quality Index.

28. More

29. Photochemical

30. A regulating factor sets a limit on the population but is also necessary for the continued existence of the population. A limiting only limits population. The predation of deer is an example of a limiting factor, without it the deer would overpopulate, overgraze, then die of starvation.

31. The law is not the same everywhere.

32. A sonic boom caused by sound waves in the air.

33. Geometrically - arithmetically.

34. True The U. S. supplied the satellite.

35. False The biological systems of the ocean are too slow and the greatest part of the ocean is too deep to really be of use. The coast of Oregon is one of the richest parts of the ocean!

36. True

37. False Strange as it may seem, it is often better in some areas for various reasons. Douglas Fir doesn't grow, when it is young, except in open areas. Clear cutting in these cases has to be done <u>correctly</u> so the land is not destroyed.

38. True The black footed ferret eats only prairie dogs. Poisons are also carried in the food chain, and if there is no prairie dogs to eat the ferret can get a bit hungry.

39. True In the old days people with bad genes died off, but now they hang around to reproduce and pass the bad genes on to their children.

40. True You have to stay there eight hours to have irreversible hearing damage.

41. False In the U. S. 60% of the suitable land is under cultivation.

42. False By comparison to the auto, war is very inefficient. Maybe with the coming of the nuclear war - shudder....

43. False Planting one kind of tree makes the forest all the same, one bug that eats that kind of tree or one disease, no forest.

44. We live on a limited earth and we have only a fixed amount of resources. We must budget and recycle our resources just as if we lived on a spaceship.

45.a. The science of the relationship of living things and their environment.

b. The science of the relationship of man and his environment.

c. An objective study of natural phenomena.

d. A group of people, their ideas and interaction.

Still have questions or disagree - speak up!!

Environmental Education Activities in Two-Semester Length

Classes Taught September 1971 to January 1972 (Fall Semester)
By Jack Whitney

Chemistry in Practice

Every student was required to read one or more of the environmental paperbacks purchased with Rachel Carson Project funds. Titles are listed, with authors, publishers and prices, at the end of this section. Approximately five copies of each title were made available. Students were allowed to choose any title. One day per week was devoted to discussion of the previous week's reading. To encourage discussion, it helped to ask each student to read a short passage, which seemed especially significant to him, and ask the group to respond to the ideas it contained. Excellent discussions developed every week. The science of environmental problems was frequently a take-off point for exploration of many other aspects of environmental problems; e.g., political, moral, economic, ethical, religious, etc.

Mr. Don May, whose job is to train water quality technicians for the Federal Environmental Protection Agency, with regional facilities in Corvallis, spent three days with this class. He taught students what properties of water are measured in pollution studies; e.g., pH, dissolved $CO_2$, dissolved oxygen, coliform bacteria concentration; etc. The small creek which runs through our campus was used for demonstration. Mr. May planned a field trip for this class, and accompanied the group to a nearby river at a place where water could easily be sampled above and below the discharge pipes for effluent from a paper mill. Mr. May's efforts generated great student enthusiasm and led several students to continue water quality studies in this area.

A graduate student in Fisheries at Oregon State University, Mr. John Thiebes, taught students a simple method for measuring dissolved oxygen. He used the campus' own creek, also, and he had students do the actual measuring.

Several good films with environmental themes were shown. Examples included "PASS CREEK", a movie which shows how poor logging practices can damage a stream severely; an excellent set of films produced by Xerox Corp., each 50 minutes in length, "WANDERING THROUGH WINTER", "NORTH WITH THE SPRING" and "JOURNEY INTO SUMMER". These films are beautifully done. Emphasis was on the beauty which exists; only occasional hints at threats to environment are included. Another excellent film shown was "POLLUTION IS A MATTER OF CHOICE." This is a 53 minute examination of the difficult choices men face when economic problems conflict with concern for preservation of natural beauty, clean air and water, etc. Frank McGee narrates in fine style.

BOOKS READ BY STUDENTS

1. Carson, Rachel, 1962. THE SILENT SPRING. Crest. Fawcett World. $ .75.
2. Graham, Frank, Jr. 1970. SINCE SILENT SPRING. Crest. Fawcett World. $ .95.
3. Whiteside, Thomas, 1970. DEFOLIATION. Ballantine. $ .95
4. Turner, James A., 1970. THE CHEMICAL FEAST Grossman. $ .95.
5. United Nations Report (No. E.69 1.24) With A Special Foreward by George Wald. 1970. CHEMICAL AND BACTERIOLOGICAL (BIOLOGICAL) WEAPONS AND THE EFFECTS OF THEIR POSSIBLE USE. Ballantine. $1.25

Oceanography

All students were asked to read an excellent paperback, "THE FRAIL OCEAN" by Wesley Marx (a 1970 Ballantine publication @ $ .95). Written reports were required.

There were two field trips to the coast. The first was in cooperation with two other classes; one in "Human Ecology" and one in "The Natural History of Oregon". All classes were asked to look especially for "the ugly" and "the beautiful" as they travelled sixty miles by bus (one way) to the beach, and back. A picnic lunch and a short romp on the beach at Newport were possible, thanks to very good weather. A quick tour of the public museum at Oregon State's Marine Science Center and a stop at a salmon hatchery, enroute home, completed the itinerary. The trip succeeded as a nature appreciation experience and as a chance to focus on human manipulation of environment.

It seemed that all students enjoyed the trip, and most compiled long lists of the things they saw which were, to them, ugly or beautiful. Their observations provided material for spirited class discussions.

The second beach field trip was in cooperation with one other class: "Human Ecology". Weather permitted no picnic and bag lunches were eaten on the bus. The feature of this trip was a slide show illustrating life forms common to local beaches, and a talk about current research at the Marine Science Center which involved environmental concerns. For example, the students were told about research now being done at the Lab. to permit predictions of effects upon marine life of nuclear power plants now planned for construction on Oregon beaches. Also described was a study of the effects of mercury in marine waters off the Oregon coast.

Dr. Joel W. Hedgpeth, Director of the Marine Science Center at Newport, and a world authority on marine ecology came to Corvallis expressly to

speak to the oceanography class. His talk, illustrated with color slides he had taken on trips to the Antarctic, the Galapagos Islands, etc., was quite effective. Students saw and heard evidence of the results of man's tampering with wildlife and beach habitats.

Several good films on environmental topics were shown. These included: "POLLUTION IS A MATTER OF CHOICE", a 53-minute study of conflicts between conservation-minded citizens and those who needed jobs a new, heavy (polluting) industry could offer. An excellent short film, "THE END OF ONE" was shown. It had no narration but provoked a lively discussion about individual rights and needs, and about the importance of individuals.

JW/jf
1-6-72

# NATURAL HISTORY OF OREGON

by

Jerry Colonna, Helena Zimmerman, and Judith Koerner

Editor's Note: This course did not originate due to the Rachel Carson Project - it already existed in the Corvallis schools, and Mr. Colonna had taught it at Corvallis High prior to his transfer to the new CVHS this year. Portions of the course are presented here, however, because it does represent a significant contribution to a curriculum having an overall environmental emphasis. Inclusion in this report is further justified by the contributions made by the project to this course, mainly in the purchase of some instructional materials and the underwriting of one field trip. (It is possible that the project director may have contributed to the original adoption of this course in the Corvallis schools, though it is impossible to state this with certainty. That is, he introduced such a course as a teacher at The Dalles High School in 1958-60. To what degree that course may have influenced other Oregon high schools, if at all, we do not know.)

Of eight units in this one-semester course, we have chosen three for presentation here as constituting together a representative sample of the course. The teacher wrote the description of Unit I, observers wrote the descriptions of Units VI and VIII.

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UNIT I

INTRODUCTION TO NATURAL HISTORY

By Jerry Colonna

In this unit, Introduction to Natural History, the central purpose is to help the student decide whether he really wants to take this course or not. Since Natural History is an elective, I believe that a student should not take the course unless he is really interested in it.

Many students do not know what natural history is. We spend the entire week (this opening unit is but one week long) talking about what natural history is and why it is an important part of a student's education. We also discuss the course requirements. I am a demanding teacher; this is a difficult course. I should say that this course demands a real commitment on the student's part. I want them to clearly understand that so that they will realize the effort I expect them to put forth.

I usually find that two or three students will drop the course during the introductory week after finding out the effort that is expected. Those that remain are usually eager to commit themselves to an honest effort.

I will now give a brief explanation of my lesson plan outlines for this unit:

Monday: First day of class - show personal slides that survey the entire course. Emphasize field trips.

Tuesday: Show film, "Oregon and its Natural Resources," comment on film in small groups.

Wednesday: Talk about course requirements, what natural history is, and give students a pre-test on the units we will cover.

Thursday: See film, "What will Oregon be Like in 1976" (From Pacific Northwest Bell). Fill out information questionnaire on students' background.

Friday: Explain my philosophy of education, review week, again explain commitment I am expecting from each student, discuss first nine weeks projects.

As can be seen from the above, I am quite structured in my approach. I prepare lesson plans each night. I usually keep a very informal atmosphere in the classroom, however.

Mimeographed Materials

The following are some of the materials that were handed out to the students during the introductory week.

BEST COPY AVAILABLE



## OUR COURSE

"The primary responsibility, the most deep and abiding obligation of any people is to preserve, to the best of their ability, the land which they have inherited and on which they live so that their heirs may in turn have the resources for a wholesome and abundant life."

"This responsibility, this basic social obligation, has not always been met. We can excuse, to some degree, those peoples of the past who exploited the land and destroyed its natural resources in ignorance of the consequences and in the absence of techniques and knowledges which would permit them to use it wisely and constructively for their own benefit while fostering its continuing renewal."

"Oregonians have been a favored people--the inheritors of a richly endowed homeland, studded with magnificent resources which the providence of nature has wrapped in an envelope of beauty that only nature's God can bestow."

The theme of this course is twofold, but simple: one, to teach you to love and appreciate the resources and beauty of our state by having direct and understanding contact with these elements; and, two, to develop a passion for their wise use and conservation based upon a true understanding of these resources and how they may be utilized and preserved.

"No state has a greater stake in the development of sound conservation principles and attitudes by its citizenry than Oregon. No state is more dependent upon such bountiful and varied resources for its livelihood and the development of its economy."

Let us together discover the natural resources of our state and learn to use and appreciate them more fully.

The above was taken, in part, form the Forward of Outdoor Education In Oregon Schools.

Written by Leon P. Minear, former Superintendent of Public Instruction For the State of Oregon

NATURAL HISTORY OF OREGON

SEMESTER 2 - 1972

UNIT OUTLINE

| UNITS | TENTATIVE DATES | POSSIBLE FIELD TRIPS |
|---|---|---|
| 1. Introduction to Natural History | Jan 24 - 28 | |
| 2. Early Inhabitants of Oregon | Jan 31 - Feb 11 | |
| 3. Common Trees and Shrubs | Feb 14 - March 3 | 8 mile hike at Silver Creek Falls State Park, Plus Potluck Picnic. March 2 |
| 4. Freshwater Game Fish | March 6 - 31 | |
| 5. Common Game Birds | April 3 - 14 | Hike around William Finley Refuge with game biologist, April 14 |
| 6. Large Game Mammals | April 17 - May 14 | |
| 7. Physiographic Areas | May 8 - 19 | |
| 8. Use of Oregon's Natural Resources | May 22 - June 8 | Hike, picnic, swimming, and fishing trip to Marion Lake in the Cascades, June 2, Possibly overnite. |

Natural History of Oregon - Course Requirements Semester II 72

1. Field Trips

Three are planned this semester. They are completely voluntary. Also we can get together on weekends in small groups if there is enough interest.

2. Notebook

All mimeographed material, notes, tests, and homework should be kept in a notebook. They will not be collected nor graded but I strongly advise that you keep one. If you turn in a notebook at each grading period you can receive extra credit.

3. Tests

Will be objective, essay, and short answer. Except for occasional "pop" quizzes, tests dates will be announced well in advance. No makeups on unit tests.

4. Outside of Class Work

You will have outside assignments approximately once a week. Assignments will not be accepted late.

5. Grading System

Will be computed by points: A-4, B-3, C-2, D-1, F-0.
Then your total points are averaged.

6. Term Projects

You will be required to complete two term projects. The first nine weeks project will be written. The second nine weeks project must be constructed by hand.

7. Independent Study and No-Credit Credit

If you wish, you may ask to work on independent study for up to two weeks any time during the term. You must submit a proposal 2 weeks in advance. Also if you wish you can take this course on a non-graded basis. You will receive a "P" if you pass and a no grade if you fail.

8. What is Hoped to be Accomplished by Taking this Course

1. Knowledge of some basic facts about Oregon's flora and fauna.
2. An increased awareness and appreciation for Oregon's natural environment.
3. A desire to spend more leisure time taking advantage of Oregon's natural resources.

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UNIT VI

Large Game Mammals of Oregon
By Helena Zimmerman

April 17

Introduction: This three-week unit will concentrate largely on the larger mammals of Oregon.

Class activities:

Jerry had the students divide into groups of three to discuss and write down what they wanted to know about the subject. Some suggestions were: mammals' habits, locations of species, information about specific species.

After the above the class discussed key definitions with the instructor and class giving illustrative examples. Terms defined: mammal, ecology, environment, habitat, niche. There was also some discussion of Gause's Principle.

Student responses:

The class had apparently taken a field trip to Finley Wildlife Refuge where the Ranger talked to them mainly about birds. One student commented: "Before we went there I just took birds for granted. They were just there. Now I look at them."

Comments:

Birds and other wildlife apparently took on new significance after the field trip. The students were quite responsive and turned on to what they had done.

April 18

Class activities:

A student not in the class gave a talk on Zero Population Growth. She covered why population was a problem, different writers' views and solutions to the problem, what can and is being done. She also passed out quite a few handouts. She relied heavily on Ehrlich's The Population Bomb as well as ZPG pamphlets for information.

The above was followed by an Oregon State Game Commission film, "Big Game Mammals of Oregon."

Student responses"

Little noted responses to either of the above.

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Comments:

The lack of student response may have been due to poor presentation of the material. The student tried to disseminate material which she knew a little about, but she did not know enough.

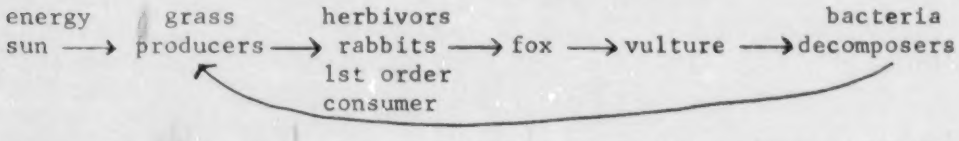
ZPG was presented apparently because the instructor feels overpopulation is the world's most pressing problem.

The film went over the class period so there was no time for student feedback.

April 19:

The scheduled activity for today was a taxidermy demonstration on a pheasant, but the guest speaker could not make it. Consequently, the class continued the discussion of key terms that was begun on Monday.

The terms "ecosystem" and "food chain" were readily and simply defined by students. The class also constructed a simple food chain with the instructor emphasizing that in reality the chain would be a myriad of cycles, not just one.




"Home range" and "territory" were defined by the students with the instructor clarifying the differences between them. He also posed the question, "What is the value of territoriality as an instinct?" Student response was lively, and they came up with:

a. Spreads out the breeding area.
b. Overpopulation taken care of naturally since the entire area is utilized.
c. Diseases are not spread as easily with the host organizms further apart and because the area is cleaner.
d. Predators do not congregate because the food is spread out.

Throughout the discussion the instructor drew parallels between animal and human behavior, postulating that some of man's actions may be attributable to territoriality.

April 20:

As an introduction to the film scheduled for today the instructor used an overhead to project a listing of the distinguishing characteristics of Oregon's three deer species and a map showing their distribution within the state. He also explained how their distribution has been affected by man.

"The White-Tailed Deer" is available through Audiovisual Aids, Gill Coliseum, Oregon State University. It was produced by the Minnesota

Game & Wildlife Department, which may explain its obvious bias. The instructor selected it because it was about a species that is relatively rare in Oregon and because it was quite strong in the area of game management.

The film did give an excellent demonstration of how game management works - but it was obviously "pro-hunter, pro-lumber for the sake of the country's economy." The message was, apparently, that game management best facilitated a balance between deer, forests, and man. It rationalized hunting and lumber practices as necessary to maintenance of a healthy deer population and brow-beat the listener with "every child in every grade in every schcol must be taught sound management principles" (my paraphrase) and laid the blame of ignorance on schools.

(The students left with strong feelings that were discussed on Friday.)

April 21:

Class began with a student demonstration on weaponry used in hunting. The instructor described it as "a basic, easy course on guns, especially those used for hunting."

Using the guns and bullets that he'd brought in, the student explained the mechanisms used in various guns, the purpose for which each gun was used, and some more technical information about the "science" involved in hunting (i.e. velocity and spin). He also expounded on some safety rules.

The last 15 minutes of the class were used for students to air their opinions of yesterday's film. They all agreed that it was biased, and there were lively interchanges between students who felt "they might have exaggerated a bit, but they know what they're talking about" and students who felt that the film obscured those facts that pointed to conclusions different from those reached in the film. There was also some hint of the morality of hunting in the discussion.

April 24:

The class began with a display and distribution of pamphlets concerning preparation and cooking of game. All such information is available through OSU's Extension Office (by College Press office).

The class then organized themselves into two groups to debate on the morality of hunting. Those students volunteering to participate then left the class to organize and gather material.

Those who were left began a review on all the material and information they've received so far on deer distributions and characteristics of each group. A handout was passed around on the black-tail and mule deer, and the instructor read aloud some information he had gathered about the white-tail deer.

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He then asked the students for a definition of species and added that in addition to similar physical characteristics the organisms must also produce viable offspring which also can mate successfully. From this definition he explained similarities between the mule and black-tail deer and touched on how the subspecies may eventually evolve into two species because of geographic factors.

The class defined "polygamous," and the instructor pointed out the advantages of being polygamous and the reason for "buck" laws.

April 25:

The instructor began the topic of the elk of Oregon by reading a story written about someone's first elk hunting trip. He then passed copies of the story around and asked for reactions. It was rather obvious (to me) that he felt rather strongly about the story, but except for a comment or two about hunting safety the class was rather lethargic.

The instructor passed out articles on the characteristics and distribution of the two elk subspecies in Oregon. Some discussion about the handouts followed.

The instructor then asked for and supplemented students' definition of "precocial" and "altricial." He asked for a discussion of the advantages involved in an organism being "precocial," but he didn't get one. He ended up lecturing on the advantages.

From that point he lectured on different behavioral characteristics of each subspecies and compared them with behaviors of deer.

April 26:

The first fifteen minutes of class was taken up by the film "The Care of Big Game Meat" put out by the Oregon State Game Commission. It was a very straight-forward film illustrationg the proper way to field-dress a buck. It also explained why certain organs and glands in a deer should be handled especially carefully (for example, the metatarsal gland on the hind foot will contaminate the whole deer if the knife isn't washed after cutting it out).

The rest of the class was held outdoors to enjoy the spring sunshine.

Today's topic was Oregon's wild horses - mustangs - a subject of great interest to certain girls in the class.

The instructor asked students what they knew about how the mustangs first got to Oregon. Some of them offered the information that they were brought up from Mexico or left by the Spanish explorers. The instructor then gave the class further information about horses crossing into Oregon along the land bridge around the Ice Age.

The class discussed the conflict between ranchers and wild horses over limited food, the lack of laws protecting mustangs, and what can be done by the students to help save them.

April 27:

Surprise quiz day!

Students were given the first ten minutes of class to review all the material covered since the beginning of the unit. After the quiz students corrected their own papers and helped the instructor determine their grades.

Also - a handout on how to build animal cages.

April 28:

Continued lecture and discussion of Oregon mammals.

The instructor passed out a partial classification scheme for mammals found in Oregon. Each category included characteristics of the order, examples, and a partial listing of the species included in the orders.

He then lectured on sea otters, covering why Oregon had a large otter population, how indiscriminate and wasteful hunting exterminated them off the Oregon coast, and how the game commission is trying to build up herds by transplanting otters from Alaska.

He also covered otters' mating and child-rearing habits.

He also discussed their eating habits, and how otters use tools to procure the attached shellfish on which they feed.

Some time was spent discussing the hypothesis that otters will never return to their original numbers. The reasoning behind that hypothesis involves the function of the otters fur and its extreme sensitivity to pollutants.

After answering questions about otters, the instructor passed out copies of "Eskimo Creation Tale" which very simply described the role of predators.

"Carnivore," "herbivore," and "omnivore" were defined and discussed.

The instructor then went on to discuss bears. He described the physical and behavioral characteristics of black and grizzly bears, and discussed the conflict between bears and the lumber industry.

The class ended with a brief description of the cat family: cougar, lynx, and bobcat. They were distinguished from each other. There was also a bit about the rarity and precariously low numbers of cougars and Canadian lynx in Oregon.

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May 1:

The instructor announced a unit test scheduled for Friday. He also passed out blurbs on the black bear, the cougar, bobcat, and lynx.

A film entitled "Ecology of Pronghorn, Mountain Sheep, and Mountain Goats" was shown. Its contents were perfectly described by the title. The film covered distinguishing characteristics, distributions, descriptions of habitats, and the animals' interaction with man. There was some discussion of the film after it was shown, most of the questions concerning points that needed to be clarified.

There was then a lecture on the dog family which includes three species of fox (kit, gray, and red), the coyote, and the timber wolf.

The instructor noted physical distinguishing characteristics, behavioral characteristics, and the animals' ranges.

In regard to the timber wolf he discussed why they were exterminated. He also discussed why the coyote has adapted so well, and how it has benefited by man's presence.

The interactions between the foxes were discussed as well as their interactions with domestic dogs.

May 2:

Debate today on the morality of hunting. The anti-hunting and pro-hunting groups were each allowed ten minutes to present their views. After presentations from both sides they were given an additional five minutes apiece to summarize or answer points raised by the other side. The audience could then direct questions to specific members, challenging their views.

The following points were emphasized by the anti-hunting group:

a. The morality of taking the life of a living animal.
b. Predators which might keep deer populations down were considered game animals, and as a result, two species, the timber wolf and cougar, have almost been exterminated in the state.
c. The argument that hunting prevents over-population is invalid because the herds are maintained and exist for the hunters.
d. A hunter can experience the "thrill of the hunt" without killing the animals.
e. There is great waste when animals are killed. Some are killed then thrown out because the hunter did not know how to dress meat; some deer are wounded, get away, then die; some hunters kill for "heads," not meat.

The pro-hunting group drew a distinction between legal and responsible hunting and irresponsible hunting. They emphasized that:

a. "Head" hunters are a minority. Most hunters hunt because its a cheap, exciting way to get meat they enjoy.

b. Hunting is a challenge. Even though the man has a gun, the deer have speed, strength, camouflage, and knowledge of the territory.
c. Hunting prevents overpopulation which leads to agonizing starvation. It's less cruel to get a clean kill than to let an animal slowly die.
d. It is no less moral to shoot a deer than it is to grow a cow and butcher it for meat.

Rebuttals and questions revolved around the above points. It was quite a spirited, almost emotional class period.

May 3:

There were six handouts today: "Pronghorned Antelope," "Beaver," "Muskrat," "Box Trap," "How Does the Game Commission Manage Oregon's Game Resources," "Off Season Hunting Opportunities for Crows, Varmints, and Predators."

George Long, an OSU graduate student in Zoology, was the guest speaker for this unit. He showed the class some slides he'd taken of deer banding, some pronghorn antelope, and a bat hunt.

Since the class had had quite a lot of information on deer and antelope, the slides served as a review for them. He did, however, come up with some new information on bats.

He passed around some close-ups he'd taken of a bat's face and of a young bat clinging to his mother. He lectured on characteristics of bats and their importance to ecology. He also lectured on their hibernation habits.

At the end of the period he passed around a preserved bat specimen and answered questions.

May 4:

Plant-A-Tree Day for the class.

The class broke up into two groups to plant fifty pine seedlings in two areas around the school.

Tree planting took about a half hour. The rest of the time was spent in free conversation.

May 5:

End of the unit on mammals of Oregon.

The students were given a choice of one of two unit tests on mammals.

The first required an application of principles that they had studied. The problem was to "create" a mammal-like organism which would "most perfectly" fit a specified environment. The students who

chose this test were required to describe features such as shape, color, body covering, other physical features, the animals home, enemies, and niche.

(It's a challenging problem requiring a synthesis of principles and facts. Unfortunately, only a couple students chose this variation of the test. Most opted for the more standard, less "brain-picking" choice.)

The alternate version was factual with one essay. To answer the questions the students must have read all the handouts and listened well in class. They were given their choice of eighteen topics in the essay section of the test. So as not to limit them solely to the class content, the last choice was "any related topic which deals with mammals of Oregon that you are interested in." Almost all the students chose this test.

HANDOUTS, UNIT VI,

LARGE GAME MAMMALS

## Unit on Mammals

I. Student suggestions:

1. Ecological problems - chemicals, extinction, loss of habitat.
2. Man's effect on mammals.
3. Study of mountain goat and elk and bears.
4. Problems caused by hunting.
5. Game management of mammals.
6. Study of carnivores.
7. Migration of mammals.
8. What is the difference between hair and fur.
9. Ranges of mammals we study.
10. Field trip to Horner Museum.
11. Guns used for hunting Oregon mammals.
12. Hibernation of bears.
13. Types of big cats in Oregon.
14. Techniques used in elk and deer hunting.
15. Wild horses in Oregon.

II. Teacher Topics:

1. Discussion on morality of hunting.
2. Mammal ecology.

Unit test on Mammals — Natural History of Oregon

Problem: to create a 'mammal-like' land organism which will 'most perfectly' fit it's environment.

Specification of the Environment:

1. Found near an alpine lake at timberline on the west side of the Cascade Mountain.
2. The climate changes a great deal, there are real seasonal differences in environmental conditions. There are 4 seasons.
3. Food supply available are: small fish, aquatic plants and insects, small mammals, grasses, shrubs, wild fruit and nuts. Your mammal does not have to eat all these foods.
4. The organism must migrate about 2 miles from it's alpine lake (elevation 7,000 feet) near the end of the summer months to a lower leveled lake (about 1,500 feet) for the winter months.

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Description: Describe the following features: Be exact, this is what you will be graded on. Remember to correlate your answers with the environmental features listed above.

1. Size and shape (consider weight, length, height and general body shape.)
2. Color (consider seasonal variations)
3. Body covering (consider hair, fur, skin, and seasonal variations)
4. Teeth and tongue (consider number, kinds, location, size and shape)
5. Method of movement (consider legs, feet, toes, claws, nails)
6. Sight (consider location and size)
7. Sound and scent (consider ears and nose, location, size)
8. Home (general description and consider seasonal variations)
9. Enemies (give 5 real living predators of your mammal)
10. Name and sex (name your organism and state whether it is male or female, tell how one could tell the difference, from distance, of the sex of your mammal.
11. Niche (what is the role your organism plays in the alpine lake it lives in - how does it effect the other organisms and the environment surrounding it)

Picture: On a separate piece of unlined paper make a rough drawing of your organism. If necessary head-on drawings or section drawings of the leg, ear, etc., may be made.

MAMMALS OF OREGON

I. Identification: Go to the side window and identify the pictures of the mammals at the ten stations. Use the common name for each species.

II. True and False: Blacken in the correct circle.

11. Only buck mule deer grow horns and these are shed annually.
12. No two animals have exactly the same niche.
13. Most mammals are not restricted to certain habitats.
14. The type of teeth mammals have indicates their diet.
15. The cougar is a serious predator of cattle and sheep.
16. The white tailed deer is abundant in western Oregon.
17. A raccoon is more related to an otter than a rabbit is to a chipmunk.
18. The snowshoe hare is a native of the sagebrush plains of eastern Oregon.
19. Man has the longest recorded longevity of all mammals.
20. All mammals supply their young with milk from mammary glands.

III. Matching: Pick the best answer. The letters should not be used more than once.

21. Ecological niche
22. Roosevelt elk
23. Food chain
24. Territory
25. Precocial
26. Order artiodactyla
27. Ecosystem
28. Nutria
29. Altricial
30. Grazer

a. A lake, stream, or mountain meadow.
b. The young of deer and elk.
c. The role and living space of a given organism in a given community.
d. The part of the home range that is defended.
e. Animals that eat mostly grasses.
f. The elk found mainly in eastern Oregon.
g. The transfer of energy through a series of organisms.
h. The elk found mainly in western Oregon.
i. Imported from South America.
j. The young of humans and mice.
k. Animals that eat mostly shrubs.
l. Hoofed animals.
m. The relationship between an organism and its environment.

IV. Fill in: Use the best word or words to complete the blanks.

31. _____ is the specific main food supply of the pronghorn antelope.

32. _____ is a hoofed mammal (besides domestic varities) that is now found in Oregon. You can not use deer, elk, or antelope.

33. The white tailed deer is commonly found near the _____ and the _____ rivers in Oregon.

34. _____ is the name of the order of mammals that comprizes almost half of all the mammalian species in Oregon.

35. Catamount and puma are common names for the _____.

36. The _____ is a mammal species that is an omnivore.

37. The _____ is a mammal that is thought to be extinct in our state.

38. The _____ is a small member of the dog family and was introduced in to the Willamette valley.

39. The number of points on deer antlers does not give a true indication of age, it is a better measure of the animal's _____.

40. The _____ is a small fox that has white inside the ears and lives in S. E. Oregon. It may be going extinct in our state.

V. Essay: (10 points) We have just completed a two week unit on the mammals of Oregon. Pick any one of the following topics to write your essay on. Your essay should not be shorter than one complete page.

1. Black tailed deer
2. Mule deer
3. White tailed deer
4. Pronghorned antelope
5. Roosevelt elk
6. Rocky mountain elk
7. Cougar
8. Bobcat
9. Black bear
10. Coyote
11. Red fox
12. Mammal game management
13. Care of big game meat
14. Why people should hunt animals in Oregon
15. Why people should not hunt animals in Oregon
16. Big game animal hunting tactics
17. Conservation of mammals in Oregon
18. Any related topic which deals with mammals of Oregon that you are interested in.

Additional handouts included:

1. Information leaflets from the Oregon Game Commission:

   "Unprotected Birds and Mammals"
   "Roosevelt Elk"
   "Rocky Mountain Elk"
   "The Human Side of Elk"
   "Blacktail Deer"
   "Mule Deer"
   "How Does the Game Commission Manage Oregon's Game Resources?"
   "Cougar"
   "Black Bear"
   "Off Season Hunting Opportunities for Crows, Varmints, and Predators"
   "Muskrat"
   "Beaver"
   "Pronghorn Antelope"

   (Publications of the Game Commission are available for in-state distribution only.)

2. "The Ten Orders of Mammals in Oregon," a teacher-prepared outline of characteristics and species of each order.

3. "Eskimo Creation Tale," demonstratating the Eskimo's appreciation of the healthy effect of predation upon a prey population (in this case, the effect of wolves upon caribou). From Never Cry Wolf, by Farley Mowat; Little, Brown and Company, Boston, 1963. pp. 124-125.

4. "A True Story," recounting a young hunter's first clumsy attempt to bag an elk.

5. A letter from Defenders of Wildlife, supporting the Secretary of the Interior in his proposal that eight species of spotted cats be added to the endangered species list, thus banning from further import any parts or products from these animals.

6. An information leaflet from Zero Population Growth.

7. Plans for an inexpensive animal cage: "Carolina Tips," Volume 34, Number 3, March 1, 1971, Carolina Biological Supply Company, Burlington, North Carolina 27215 or Gladstone, Oregon 97027.

UNIT VIII

Use of Oregon's Natural Resources

By Judith Koerner

May 22:

The final test for this unit was passed out and discussed.

It involved planning a vacation trip for this summer. The trip must be at least one weekend in duration and must take place in Oregon. The cost was only to include what came out of the student's pocket.

The rest of the period was spent with literature and catalogues on back-packing and camping. These were distributed to the class and they spent the remaining time going through them.

A partial list follows:

1. The book 100 Oregon Hiking Trails
2. Survival Manuals
3. Article from National Geographic, "Skyline Trail"
4. Catalogues from Eddie Bauer, Gerry, Frost Line, Kelty

May 23:

Class was not held today; instead the entire school was shown the film, "Grapes of Wrath."

May 24:

An ad from a forest products corporation was distributed without comment.

Then a student, Anna Fang, presented a report on animal cruelty. Her major source of information had been the "Defenders of Wildlife" magazine. She discussed the abuses of animals being used for scientific research, roadside zoos, and predator control. She distributed literature and photographs dealing with some of the problems. She had given the report in the class, "Science and Society," and asked to be able to present it to the class.

The teacher spent the rest of the period discussing equipment needs for back-packing. Appropriate handouts were given out.

May 24:

Maps needed to be topographical so you could see the elevations involved.

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Clothing was discussed and dressing in layers was emphasized.

1. Long underwear - could be purchased from Payless for $1.47
2. Work shirt
3. Light-weight wool sweater
4. Nylon parka

May 25:

Today was spent in a discussion of how to select a back-pack. The class was formed into a semi-circle.

Some factors to be considered in making an intelligent selection of a back-pack include:

1. Quality of material
   a. Waterproof rather than water-repellant or water-resistant material should be used.
   b. Rip-stop nylon is the lightest and most durable fabric.
2. Get the correct size.
3. Get a comfortable pack - look for frame contours and padding.
4. Construction - magnesium is durable and light. Look for a welded frame.
5. Brand name - can also work against you in that you pay for the name.

The teacher than showed several types of packs.

1. A plain bag can be thrown over the shoulder; usable for one day - very little cost involved.
2. Cloth pack with no frame made of canvas; not water proof but cheap and usable.
3. Eddie Bauer $40.00 pack - water proof, leather bottom, aluminum construction, padded straps.
4. Kelty Pack - $53.00 - water resistant, magnesium frame, welded construction, padded straps, compartmentalized.
5. Summit or Day Pack - $3.35.

The rest of the period was spent examining the equipment and looking through equipment catalogues. Kelty, Gerry, Camp Trails, and Eddie Bauer were represented.

May 26:

Two guest speakers were present today, Mark Doverspike, a student at Crescent Valley and Larry Withrow, a student from O.S.U. and the leader of a local boy scout troop.

They were about to leave on a back-packing trip to the Cascades and brought their full packs to the class. Them demonstrated how to pack things and discussed the merits of various sleeping bags. They showed the class a tent weighing four pounds and showed the food including freeze dried items they were taking.

May 29:

Memorial Day - no school.

May 30:

A possible field trip to Marion Lake was discussed. The class would leave Saturday and return Sunday night.

Mr. Colonna announced that although he wanted a field trip, there were several problems involved:

1. The school would not accept sponsorship.
2. Students must provide their own equipment: essentials included tents (may be shared), sleeping bag, back-pack, food, small stove (if possible)
3. Transportation - parents would have to be enlisted to help with transportation and could accompany us on the trip.

It was announced that projects are due tomorrow.

The handout, "Camping Manners for Wilderness," was discussed. It was emphasized that your goal in camping should be to leave the campsite in better condition than you found it. The existing fire area should be used. Don't use rocks from the river bottoms as they tend to explode upon heating.

In the Cascade area there is plenty of wood but only down timber should be used.

The class then went outside and the teacher put up his lightweight tent, Swedish made with a rain cover, cost $86.00. The price was high due to the light weight and the import quality.

The rest of the class was spent discussing shoes for hiking. The points stressed included:

1. Wear two pairs of socks - one light weight pair and a heavy wool outer sock.
2. You should be able to get a good shoe for $18-20., look for one that fits tight in the heel and loose in the toe. You'll need room in the toe for circulation and for down hill climbing.

   Other desirable qualities include:
   a. Vibirum soles
   b. Heavy duty lacing with hooks rather than holes
   c. padded tongues
   d. stretch fabric at ankle
   e. outer covering of waterproofable leather
   f. steel or hard toes
   g. minimum of stitching in construction

May 31:

A recipe handout was given out. The recipes were for car camping, not back-packing.

The projects were turned in. They included:

1. A bird house
2. A display, "Agates and Gemstones"

3. Handmade bicycle pack
4. Photo essay
5. Handmade fishing rod
6. A slide presentation of the wild flowers of Oregon and a book with many of the flowers pressed.

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The rest of the period was spent looking at the teachers down sleeping bag. The qualities of down were emphasized - it is lighter, warmer and will not bunch as with other fabrics.

The field trip was canceled due to lack of interest.

June 1:

Today we had a student demonstrate his photography equipment. He was interested in wildlife photography and had done a photo essay on a sparrow. He showed his enlarger, chemicals, and the cameras involved. There was a discussion of problems involved with wildlife photos.

At the conclusion of the demonstration the teacher showed his small Gerry back-packing stove. It is small, light-weight, cost about $7.00, and uses bottled gas.

He also brought a roll of insulated, light-weight foam rubber he uses as a mattress.

June 2:

The class was dismissed today to attend the "Mock Political Convention" in the auditorium.

June 5:

Handout, "Cereal for Backpackers."

Movie: "The Forest Adventure."

Note: Mr. Colonna does not recommend this film for further use.

The movie was a general presentation of "tips" for hikers and campers - areas covered included:

1. What to do if you get lost
2. Collecting fire wood
3. Putting a fire out
4. The use of a knife
5. The use of an ax
6. Use of a compass
7. Tips on water safety.

The teacher also demonstrated his $.50 Sierra Club cup. He uses it as a dish, to scoop fresh water as he hikes, as a coffee cup, etc. He can hang it on his belt and have it readily available.

June 6:

Today consisted of a wrap-up of odds and ends of the back-packing unit. Some of the points discussed were:

A supply of halazone tablets (65¢ per 100 pills) should be part of a back-packers equipment. Water is plentiful and pure in the Cascades, but this does not apply to all areas, particularly eastern Oregon.

Food should be nutritious, fast cooking, light-weight, and keep well. If any of these qualities are lacking, look for a substitute.

The class discussed the food list from Kelty of Glendale, California. Freeze dried foods and Lipton dinners were given as good examples of foods to take, also cheese and crackers, jerky and gork for along the trail and for lunch.

Recipe for gork
Equal parts - M & M's
cheese (monterey jack)
nuts
bits of jerky
extra salt

Extra salt should be provided in some form - either salt tablets or in food. Be sure to take salt tablets with plenty of water or else they may irritate the intestine.

Cleanliness in preparing food and washing dishes was strongly emphasized. Diarrhea can always be traced to improper cleanliness.

Pack weight should be 20-25% of body weight.

A poncho that could double as a ground cover was demonstrated. It was not recommended as it stretched and tore easily.

Handouts included a pamphlet on O.S.U.'s outdoor program and first aid information.

Discussion of physical fitness handed out, especially for parents, and a bibliography.

June 7:

The unit "test" of vacation trip plans were returned. The comment was made that most students forgot to include insect repellent in their plans. Cutters Insect Repellent was recommended.

The students were then asked to evaluate their performance in the class. The instructor wanted the students feelings about what their grade should be, though he may or may not give them the grade they recommended.

The students were also asked to evaluate the teacher. He requested thoughtful, honest evaluations.

June 8:

Last day of school. The class met briefly outside. Mr. Colonna said good-bye to the students, wished them well and expressed great satisfaction with the class and the students personally. He volunteered his assistance in any way he could be useful, as a counselor or a fishing companion.

Comments:

This course has presented a wealth of material. The subject matter is usable, interesting, well organized. I have observed a variety of activities, slide presentations, group work, guest speakers, student presentations and informal lectures.

I became most involved in the course myself. I'm sure I will find many uses for what I have learned.

The students did work. Projects and assignments were given and received on a no nonsense basis. Many students voluntarily took over a presentation, interest was high and consistent. My only disappointment was lack of student response in class discussions especially with regard to questions of controversy.

With no visible effort, Mr. Colonna maintained an excellent atmosphere for learning. There were no class disruptions; we were all busy and interested. Additionally, Mr. Colonna took great pains to be objective and fair in all areas, to his students in terms of grades and assignments and to issues in terms of presenting both sides of the question - popular and unpopular, environmental interests versus private interests. He is to be commended for his fine course.

HANDOUTS, UNIT VIII,

USE OF OREGON'S NATURAL RESOURCES

Final Unit Test — Natural History of Oregon

Directions:

Plan a complete *vacation trip to some area in Oregon. The more detailed and creative the write-up, the higher the grade and the more enjoyment you will have.

Include everything you think necessary and make sure and include the following:

1. Who are the people involved?
2. Where are you going (draw a detailed map).
3. Why have you chosen the above area?
4. Plans for each meal (what will you eat and how it is prepared).
5. A complete list of all items needed to take on the trip.
6. Cost of entire trip (gas, food, new equipment, etc.).
7. Any other information which you feel would be important to include.

PLEASE PLAN THIS TRIP TO BE AT LEAST ONE WEEK-END IN DURATION--
ALL DAY SATURDAY AND SUNDAY.

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* could be car camping, backpacking, snow camping, fishing, hunting, trailer camping, etc.

# EQUIPMENT CHECK LIST

A. The Ten Essentials for all trips
- Map
- Compass
- Flashlight
- Extra clothing
- Extra food and water
- Sunglasses
- Waterproof matches
- Candle or fire starter
- Pocket knife
- First aid kit

B. One Day Trip Wear
- Boots
- Underclothing - cotton
- Socks - wool
- Pants - wool, heavy cotton
- Shirts - cotton, flannel, wool (lightweight)
- Sweaters - wool (lightweight)
- Parka or wind breaker
- Hat
- Rucksack
- Lunch

C. Overnight Trip - Add to pack
- Sleeping bag
- Air mattress (if desired)
- Ground cloth and tarp tent
- Food - for additional meals
- Cooking kit
- Extra clothing
- Back pack

D. Add for Snow trips
- Ice ax
- Gloves - mittens
- Crampons
- Slings
- Rope (120' nylon)
- Stove and fuel
- Woolen undershirt
- Longjohn drawers
- Goggles
- Chapstick (and sun lotion)

E. Add for Rock Climbing Trips
- Rock climbing shoes
- Leather gloves
- Slings
- Pitons and carabiners
- Ropes
- Piton hammer
- Hard hat

F. Add for Desert Trips
- Chapstick (and sun lotion)
- Extra canteens
- Broad-brim hat
- Light-colored, porous clothing
- Swimming suit
- Walking shoes

G. Extras (to fit the situation)
- Camera
- Camp shoes
- Light ax and shovel
- No. 10 cans to cook in
- Dry clothes (for return trip)
- Poncho
- Nylon cord, 30' x 1/8"
- Sewing kit
- Safety pins
- Can opener
- Insect repellent
- Water purifying pills
- 50' fish line and hooks
- Pencil and notebook
- Watch
- Toothbrush, toiletries
- Toilet paper (should be the eleventh essential)

## BIBLIOGRAPHY

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Backpack Cookery, Ruth Dyer Mendenhall, available through Rec. Equip. Co., $1.50.

Climbers Guide to Oregon, Nicholas A. Dodge, Mazawas, 1968, $3.95.

Dictionary of Oregon History, Howard McKinley Corning, ed., Binfords & Mort, Portland, 1956, $6.00.

Field Guide to Western Birds, Roger Tory Peterson, Houghton Mifflin, 1961, $4.95.

Geology of Oregon, Ewart M. Baldwin, Edwards Brothers, Inc., 1964, available thru U of O Co-op Store, Eugene, $3.95.

Going Light by Backpack or Burro, David R. Brower, ed., Sierra Club, 1964, $2.95.

How to Know the Birds, Roger Tory Peterson, Signet Paperback, 1963, $.60.

Map, Compass and Campfire, Donald E. Ratliff, Binfords & Mort, Portland, 1964, $2.50.

Manual of Ski Mountaineering, David Brower, ed., Sierra Club, San Francisco, 1962, $3.75

Nordic Skiing, Michael Brady, Drayers-Forlag, Oslow, 1966, $2.50.

100 Oregon Hiking Trails, Don and Roberta Lowe, Touchstone Press, Portland, 1969, $5.95.

Ski Touring, William E. Osgood and Leslie J. Hurley, Tuttle Co., Vermont, 1969, $5.00.

Stalking the Wild Asparagus, Euell Gibbons, David McKay Co., New York, 1962, $7.95.

Steans Mountain, E. R. Jackman and John Scharff, Gaxton Printers, Ltd., 1968, $25.00.

For information about current Operation Golden Eagle, write Department of the Interior, Bureau of Outdoor Recreation, 450 Golden Gate Ave., Box 36062, San Francisco, California 94102.

Other handouts included:

1. Literature from conservation groups and private industry, presenting opposing arguments on wilderness legislation and forest-oriented recreation.

2. Camping recipes.

3. First aid instructions.

4. A check list and article describing, item by item, equipment needed for backpacking, availability information, etc.. Source unknown.

5. A leaflet, "Camping Manners for Wilderness," from Sierra Club, 1050 Mills Tower, San Francisco 94104.

6. A list of map sources and useful Sierra Club books, from the Sierra Club.

7. Physical fitness tips, by David L. Engebretsen. From Wilderness Camping magazine of September-October, 1971.

8. Forms for student self-evaluation and for evaluation of the course and teacher.